EXHIBIT 5

United States Patent [19]

Sanchez et al.

[54] METHODS FOR HANDLING MASA

[75] Inventors: Victor R. Sanchez, Fontana; Alberto Ceja, Pico Rivera; Rigoberto Anguiano, Baldwin Park, all of Calif.

[73] Assignee: Machine Masters, Inc., Pomona, Calif.

[21] Appl. No.: 476,198

[22] Filed: Jun. 7, 1995

Related U.S. Application Data

[62] Division of Ser. No. 192,458, Feb. 7, 1994.

[51] Int. Cl.[6] A21C 9/00

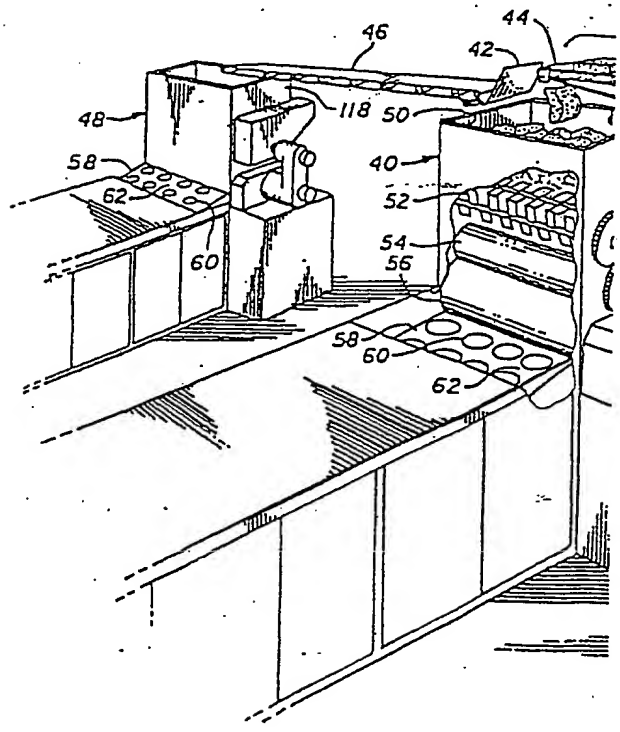
[52] U.S. Cl. ..... 426/496; 426/502; 426/503; 426/512; 426/518; 99/443 C; 99/353; 198/604; 198/607; 198/626.1; 221/84

[58] Field of Search ..... 426/391, 496, 426/502, 503, 516–518, 512, 549; 99/443 C, 352, 353; 198/604, 607, 626.1; 221/71, 74, 84

[56] References Cited

U.S. PATENT DOCUMENTS

3,693,533	9/1972	Liepa	99/234
3,853,016	12/1974	Lane, III et al.	74/231
3,869,971	3/1975	Driscoll	99/353
4,304,326	12/1981	Fowler	198/623
4,334,845	6/1982	Tamminen	99/353 X
4,640,843	2/1987	Matuszak et al.	426/560
4,661,364	4/1987	Campbell	426/496
4,778,690	10/1988	Sadel, Jr. et al.	426/560
4,978,548	12/1990	Cope et al.	426/439
4,985,269	1/1991	Irvin et al.	426/560



US 5635235A

[11] Patent Number: 5,635,235

[45] Date of Patent: Jun. 3, 1997

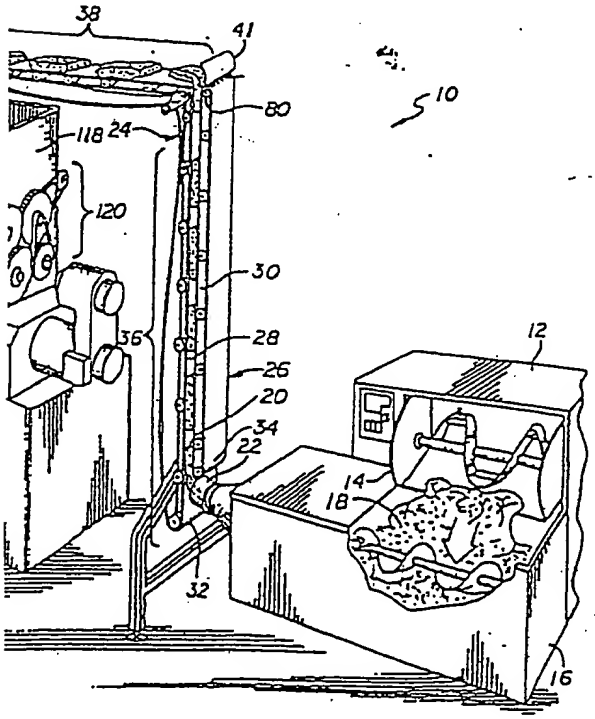
5,050,727	9/1991	Akesaka	198/626.1
5,158,792	10/1992	Mochizawa et al.	426/503 X
5,200,203	4/1993	Hayashi	198/604 X
5,272,962	12/1993	Kageyama et al.	99/353

Primary Examiner—Milton Cano
Attorney, Agent, or Firm—Keith A. Newburry, Esq.; Pretty, Schroeder, Brueggemann & Clark

[57] ABSTRACT

Masa handling methods for the continuous processing of masa type dough in conjunction with commonly available feed processing equipment, such as a masa extruder, an oven, or cooling apparatus. One masa handling method includes a masa separator having a pair of opposed, endless belt conveyors having facing surfaces spaced apart to receive a generally continuous masa stream output from a nozzle on the masa extruder. When the masa stream moves between the conveyors, it is gripped by their facing surfaces and moved away from the nozzle, causing the masa to be separated into individual pieces, or logs. The masa handling method can also include feeding the masa to masa hoppers fed by at least two endless belt conveyors arranged in upstream and downstream positions relative to each other. The masa is transported along the conveyors and is automatically diverted into one masa hopper by a diverter gate operated by a controller that receives a signal from a sensor sensing a masa level within an associated one of the hoppers. The hopper has one or more rotating shafts having projections to remove gas bubbles from the masa and force it toward the sheeter rollers. A pair of primary rollers with scrapers can be provided within the hopper to roll the masa to an intermediate thickness before it passes between the sheeter rollers.

20 Claims, 4 Drawing Sheets



METHODS FOR HANDLING MASA

This application is a division of application Ser. No. 08/192,458, filed Feb. 7, 1994.

FIELD OF THE INVENTION

The present invention relates to an apparatus and method for the commercial manufacture of food or edible material, and, more particularly, to the treatment or preparation of farinaceous dough, banter, or pastry products including sheeting, laminating, or folding.

BACKGROUND OF THE INVENTION

A tortilla is a baked grain product which originated in Mexico and is now widely consumed throughout the world. The word tortilla as used herein refers to such a baked grain product having a variety of shapes, including a circular shape, formed from a relatively flat dough. While the present invention concerns the production of tortillas, the invention also may also successfully used in the production of food products having other shapes.

As the demand for tortillas has grown, the methods and the apparatus for automatically producing tortillas in high volumes has become well known. In the conventional automated system, a dough is produced by cooking whole corn and grinding it wet or by combining instant corn masa flour with water in a commonly available mixer. This dough is generally referred to as "masa". However, the term "masa" as used herein refers to this corn dough and other doughs having similar characteristics. The masa is often fed into an extruder which compresses the masa and outputs it in the form of a generally continuous stream to a pneumatic cutter. The pneumatic cutter chops the masa into generally cylindrical pieces, generally known as "logs". The logs are usually carried on a conveyor to a masa hopper, which gravity feeds the masa to several successive pairs of generally opposed, cylindrical rollers for compression into a sheet having the thickness required for tortilla production. The final pair of opposed rollers are generally known as "sheeter" rollers because they produce a thin sheet of masa. This "sheeted" masa is then cut into the desired tortilla shape by a commonly available rotary cutter, which usually cuts circles of varying diameter. The cut masa is then baked, cooled, and packaged by commonly available commercial food processing equipment.

A portion of an automatic masa processing system is shown in the Driscoll U.S. Pat. No. 2,869,971. The masa processing system described by Driscoll has an endless belt conveyor for feeding masa to a masa hopper. The masa within the masa hopper is then gravity fed into a pair of opposed, counter-rotating primary rollers which compress the masa into a wide curtain of an intermediate thickness. The curtain then moves along a conveyor to a set of sheeter rollers for a final compression into the sheet having a thickness suitable to form the desired tortillas. The sheeted masa is then moved, via conveyor, through a rotating cutter which stamps circular shapes in the masa sheen. Although the rest of the Driscoll apparatus is designed to manufacture food chips from the cut masa, the remainder of the process of baking and cooling tortillas, which only generally concerns this invention, is well known and is schematically shown in the Cope et al. U.S. Pat. No. 4,978,548. Also by way of reference, another Matuszak et al. U.S. Pat. No. 4,640,843, describes a masa extruder and a masa hopper feeding two primary rollers and one associated sheeter roller.

The inventors of the present invention have no reason not to believe that the masa processing system previously

described is not generally effective and safe. However, under certain conditions, there may be some drawbacks associated with masa processing systems generally designed according to the prior art. One such drawback can be the danger associated with the pneumatic cutter. The pneumatic cutter has a reciprocating blade which could injure an attending worker if that worker places his or her hands under the operating blade.

Another drawback can be associated with the conveyors intended to transport the masa logs from the pneumatic cutter to the masa hoppers. With increasing demand for tortillas, many companies now desire to operate several parallel production lines, each line having its own masa hopper and its own associated subsequent rolling, cutting, cooking, cooling, and packaging apparatus. Generally, because one masa mixer and extruder can output enough masa to adequately supply several production lines, it is desirable to have an automatic masa hopper feed system capable of maintaining an adequate supply of masa within each masa hopper. However, the conveyors designed according to the prior art simply move masa logs from the pneumatic cutter to one masa hopper. Thus, a masa handling system built according to the prior art could require several conveyors, each running independently from the pneumatic cutter to an associated masa hopper. Furthermore, human attendants could be required to monitor the level of masa in each masa hopper and guide the masa logs onto the conveyors which are running to near-empty masa hoppers. Such a system could have evident disadvantages due to the labor cost of the attendants and the awkwardness of the manual channeling of masa to each conveyor. Furthermore, if the system utilizes only one conveyor running past the masa hoppers in series, the unwanted labor expense is also necessary because human attendants could be required to maintain the masa levels by manually carrying the masa logs from the conveyor to a near-empty masa hopper.

Yet another drawback can be associated with the masa hoppers generally designed according to the prior art. Unwanted gas bubbles can become trapped in the masa and cause voids in the wide masa curtain output by the primary rollers. When this occurs, the voids persist as the masa continues through the sheeter rollers and the rotary cutter, causing imperfectly formed tortillas to be produced. To eliminate the voids, human attendants must manually compress the masa while it is in the masa hopper, resulting in undesirable increased costs.

One final drawback associated with the primary rollers designed according to the prior art can be the tendency of the masa curtain to adhere to the primary rollers after its initial compression. If the masa curtain exits from the primary rollers in a fashion whereby it is stuck to the surface of one of the rollers, the curtain can be carried around the primary roller and away from the sheeter rollers. As a result, the flow of masa to the sheeter rollers can be substantially disrupted.

It should, therefore, be appreciated that there still is a need for masa processing system that has the following features: the safe separation of the masa into individual logs; the automatic distribution of those logs to the masa hoppers requiring resupply; the automatic removal of gas bubbles from the masa within the masa hopper; and the prevention of the masa curtain from becoming stuck to the primary rollers. Accordingly, the present invention fulfills all of these needs.

SUMMARY OF THE INVENTION

The present invention provides a masa handling system that has the following features: the safe separation of the

masa into the individual logs; the automatic distribution of those logs to the masa hoppers requiring resupply; the automatic removal of gas bubbles from the masa within the masa hoppers; and the prevention of the masa curtain from becoming stuck to the primary rollers. The masa handling system of the invention is for use in conjunction with commonly available food processing equipment, such as an oven and cooling apparatus for the commercial processing of masa. By way of example, the present inventors refer to masa, but intend to include other similar doughs within the meaning of the word "masa."

Such masa processing equipment generally has a masa producing device, typically a mixer and an adjacent extruder which produces a generally continuous stream of masa to the invention. The masa is processed according to the invention and is ultimately fed into a pair of opposed, aligned, counter-rotating sheeter rollers which compress the masa into a final thickness.

More particularly, the masa handling system has a masa separator having a pair of aligned, opposed endless belt separator conveyors. The separator conveyors have their facing surfaces spaced apart and generally parallel to define a masa chamber therebetween. The masa chamber has input and output ends. The masa separator also has a nozzle connected to the masa producing device for feeding masa into the input end of the masa chamber. When the masa enters the masa chamber, it is gripped by the facing surfaces and moved therebetween. The facing surfaces of the separator conveyors move in the same direction away from the nozzle and cause the masa to be separated into masa logs.

The masa handling system includes at least two masa hoppers and at least two endless belt feed conveyors which have upper surfaces that move in the same direction. The feed conveyors are arranged in relative upstream and downstream positions relative to each other. The upstream feed conveyor extends from the output end of the masa chamber defined by the opposed, aligned separator conveyors of the masa separator, receive the masa logs. The upstream feed conveyor extends no a point generally above one of the masa hoppers. The downstream feed conveyor extends from a position spaced from the upstream conveyor to a point generally above another of the masa hoppers.

The masa handling system also has a diverter gate that is positioned between the feed conveyors. the diverter gate selectively moves between a first position and a second position. When the diverter gate is in the first position, the mesa logs are guided from the upstream feed conveyor to the downstream feed conveyor. When the diverter gate is in the second position, the masa logs are guided into the masa hopper.

The masa handling system also has a sensor associated with each masa hopper for the sensing of the level of masa therein. The sensor causes a signal which changes its state when the level of masa in the associated masa hopper is below a predetermined level. A mechanism is connected to each diverter gate and is responsive to the signal from the sensor. The mechanism moves the diverter gate from the first position to the second position when the level of masa is the one masa hopper is sensed to be below the predetermined level. The mechanism returns the diverter gate to the first position when the level of masa in the one masa hopper is sensed to be above a predetermined level.

The masa hoppers are self feeding and each has an opening positioned for receiving masa from its associated feed conveyor. Each masa hopper also has a gravity feeder with side walls and a bottom wall cooperating to define a

space for the placement of the masa to be fed to the sheeter rollers. One or more rotating shafts are mounted within the gravity feeder. Each shaft has projections which remove gas bubbles from the masa and force the masa towards the sheeter rollers. The bottom wall of the gravity feeder extends from the side walls and defines a slot which the masa passes through, towards the sheeter rollers.

The foregoing structural arrangement of the invention provides several important advantages. Chief among them is the safe separation of the generally continuous masa stream into masa logs. As discussed above, the devices designed according to the prior art incorporate a pneumatic cutter that has a blade which can injure attending workers. Accordingly, it is desirable to separate the masa stream into masa logs without the pneumatic cutter and its associated danger. The present invention avoids this problem because it does not utilize a cutter with a blade. Therefore, the present invention offers a relatively safer apparatus which can separate the masa stream into masa logs.

Another advantage associated with the invention is the automatic distribution of the masa logs to the individual masa hoppers requiring resupply. As discussed above, it is desirable to eliminate the cost of the human labor associated with maintaining the proper level of masa within each masa hopper. The automatic monitoring by the sensors and the corresponding automatic operation of the diverter-gates provides for the automatic distribution of masa logs to the masa hoppers. Accordingly, the supply of masa within each masa hopper is advantageously maintained without the costs associated with human labor.

Yet another advantage with the invention is the automatic removal of gas bubbles from the masa within the masa hoppers. As discussed above, it is desirable to eliminate the human labor associated with the removal of the gas bubbles from the masa within the masa hoppers. The projections on the rotating shafts advantageously compress the masa and remove the gas bubbles without any corresponding human labor. Accordingly, the gas bubbles are advantageously removed without the costs associated with such human labor.

In one aspect of the invention, the facing surfaces of the separator conveyors are curved toward each other so that a cradle is formed for securely holding the masa between the separator conveyors. As compared to an arrangement having flat facing surfaces, the masa is less likely to move out from its position between the separator conveyors.

In another aspect of the invention, each masa hopper has a scraper for each of its primary rollers. Each scraper has a blade which is pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller. The blade separates the masa which has adhered to the surface of the primary roller. An advantage associated with this aspect of the invention is the prevention of the masa curtain from becoming stuck to the lower surface of the primary rollers. As discussed above, it is desirable to maintain the movement of the masa curtain toward the sheeter rollers. When the masa curtain adheres to one of the primary rollers, the masa curtain may not continue toward the sheeter rollers. Accordingly, this aspect of the invention advantageously ensures that the masa curtain travels toward the sheeter rollers instead of becoming diverted by adherence to one of the primary rollers.

It will be appreciated that, while the masa handling system of the present invention is especially adapted for use with a corn based masa dough, the invention will also handle any dough that has similar properties. Accordingly, the

invention could also be used in conjunction with any other dough which could be handled according to the masa dough handled by the present invention.

Other features and advantages of the present invention will become apparent from the following description of the preferred embodiment, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The following drawings illustrate the preferred embodiment of the invention. In the drawings:

FIG. 1 is a perspective view of a masa handling system, partly in cut away section.

FIG. 2 is a side view showing the separator conveyors accepting masa from the nozzle.

FIG. 3 is a cross-sectional elevational view of the separator conveyors shown in FIG. 2.

FIG. 4 is a cross-sectional elevational view, partially in cut-away section, of the idler rollers shown in FIG. 3.

FIG. 5 is a side view of several feed conveyors positioned over two masa hoppers, shown in partial cut-away section.

FIG. 6 is a side view of a diverter gate shown in FIG. 5.

FIG. 6A is an end view of the diverter gate shown in FIG. 6, shown in partial cut-away section.

FIG. 7 is a side view, in partial cut-away section, of a masa hopper shown in FIG. 1.

FIG. 8 is a perspective view of the A/C motor and drive gears for the primary rollers and rotating shafts shown in FIG. 7.

FIG. 9 is a detail perspective view of the rotating shafts shown in FIG. 7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the exemplary drawings, the present invention is embodied in a masa handling system, generally referred to by the reference numeral 10, for use within a food processing system which produces a food product made from masa. Masa is a dough produced by cooking whole corn and grinding it wet or by combining instant corn masa hour with water in a commonly available mixer. This dough is generally referred to as "masa". However, the term "masa" as used herein refers to this corn dough and other doughs having similar characteristics.

The preferred masa handling system 10 (FIG. 1) is a part of a larger arrangement of apparatus intended for the commercial production of tortillas or other food having a masa dough as an ingredient. The general arrangement of the preferred masa handling system 10 will now be described. A commonly available commercial mixer 12 is located at the beginning of the production line. The mixer 12 has a pivoting door 14 which can rotate downward towards a masa extruder 16. The masa extruder 16 can be of any type, as long as it compresses the masa 18 and feeds a generally continuous masa stream 20 through a nozzle 22. Two vertically opposed and aligned endless belt separator conveyors 24 and 26 have moving surfaces 28 and 30 which face each other. The longitudinal ends 32 and 34 of separator conveyors 24 and 26 are mounted adjacent to the nozzle 22. One of the two separator conveyors 24 is "L" shaded and has a vertical section, or vertical portion, 36 and a horizontal section, or horizontal portion, 38 which terminates above [a] **an intermediate** masa hopper 40 **that is in between two feed conveyors as shown in Fig 1**. The vertical section 34 of the "L" shaped -

separator conveyor 24 extends longitudinally below the longitudinal end of the other separator conveyor, thereby providing a moving surface opposite from the nozzle 22. A deflector plate 41 is mounted on the end of the other separator conveyor 26. The previously discussed separator conveyors 24 and 26 move the masa 18 to the first **intermediate** masa hopper 40. That masa 18 hopper 40 must be supplied with masa 18 periodically.

A selectively operable diverter gate, for periodically allowing resupply of the masa hopper 40, is located **[adjacent to the end 44 of] in a gap between an upstream feed conveyor (**the horizontal section 38 of the "L" shaped separator conveyor 24 **as shown in Fig. 1) and a downstream feed conveyor 46.** The diverter gate 42 is shown in its open **gap** position. However, when the diverter gate 42 is **[closed] in a closed gap position**, its top surface 45 forms a gravity slide that feeds to a horizontal **downstream** feed conveyor 46, which, in turn, feeds another masa hopper **which, as shown in Fig. 1, may be an end masa hopper** 48. It will be understood that while two masa hoppers 40 and 48 are shown, the masa handling system 10 can be adapted for use with any number of masa hoppers. Therefore, the invention is not limited by the number of masa hoppers.

Each masa hopper 40 and 48 has a hollow inner gravity feeder portion 50 containing two counter rotating shafts 52 mounted above a pair of primary rollers 54. The primary rollers 54 are, in turn, mounted above a pair of sheeter rollers 56 and a common rotary cutter (not shown). A horizontal tortilla conveyor 58 is mounted below the rotary cutter and has tortillas 60 on its upper surface 62. The remainder of the system can include various combinations of commonly known and widely available commercial food processing apparatus (not shown), such as an oven, a cooling rack, and a packaging system.

The masa handling system 10 has a structure intended to separate masa logs 74 from a continuous stream of masa 20 (FIGS. 2, 3, and 4). The masa extruder 16 is connected to a nozzle 22. The nozzle 22 has a generally circular cross section and is angled so than its end 64

is slightly elevated. A generally continuous masa stream 20 is shown exiting from the nozzle 22. The ends of two aligned, opposed, vertical endless belt separator conveyors 24 and 26 are spaced apart and each pass around an associated one of two drive rollers 66 adjacent to the nozzle 22. The drive rollers 66 are connected to a variable speed A/C motor 82 via a belt 70, which also passes around a tensioner wheel 72. The "L" shaped separator conveyor 24 extends longitudinally below the end of the other separator conveyor 26 and has a moving surface 28 facing the nozzle 22. The other separator conveyor 26 also has a moving surface 30. The separator conveyors 24 and 26 are spaced to hold masa pieces, or logs 74, between them. The distance separating the two separator conveyors 24 and 26 will vary with the size of the generally continuous masa stream 20 extruded from the nozzle 22. The space between the moving surfaces 28 and 30 of the separator conveyors 24 and 26 defines a masa chamber 76. The masa chamber 76 extends the vertical length of the separator conveyors 24 and 26 and has an input end 78 adjacent to the nozzle 22 and an output end 80 where the masa logs 74 are deposited onto the horizontal section 38 of the "L" shaped conveyor 24. The separate conveyors 24 and 26 must be driven in order to separate the masa logs 74 and move them away from the nozzle 22.

The variable speed A/C motor 82 is provided to drive the separator conveyors 24 and 26. The A/C motor 82 has an upper knob 84 to enable the user to adjust its speed. The required power of the motor 82 varies with the length of the separator conveyors 24 and 26 to be driven, however, an A/C motor 82 between 1/2 and 3 horsepower is generally adequate for most applications. The method by which the speed of the

motor 82 is adjusted is commonly known and can be either by a mechanical means, such as a gearbox (not shown), or an electronic means, such as by an A/C frequency inverter (not shown). While the masa 74 moves upward, the masa 74 must be prevented from falling out from between the separator converyors 24 and 26.

The moving surfaces 28 and 30 of the separator conveyors 24 and 26 are supported by trapezoidal idler rollers 86 which keep the masa logs 74 between the separator conveyors 24 and 26. The trapezoidal idler rollers 86 cause the moving surfaces 28 and 30 of the separator conveyors 24 and 26 to curve toward each other on their edges 88. Because the edges 88 of the moving surfaces 28 and 30 are curved toward each other, a cradle 90 is formed for securely holding the masa logs 74 between the separator conveyors 24 and 26. Each idler roller 86 is fastened to the frame 92 of the conveyors 24 and 26 by well known means, such as by a threaded axle 94 and a nut 96. After the masa logs 74 have been separated from the masa stream 20, they must be guided into a masa hopper 40 which requires resupply.

The selectively operable diverter gate 42 (FIG. 5) is mounted **in a gap** between an upstream 98 and a downstream 100 endless belt feed conveyor and guides the masa logs 74 to the appropriate masa hopper. The feed conveyors 98 and 100 are positioned end to end **thereby forming the gap between them (as shown in Fig. 5)**, and are vertically spaced so that the masa logs 74 can move from one feed conveyor 98 and 100 to the next, in series. The diverter [gaze] **gate** 42 is pivotally mounted on the downstream feed conveyor 100 and, in the closed **gap** position, extends to the end of the upstream feed conveyor 98 thereby **closing the gap by** forming a gravity slide between the two feed conveyors 98 and 100. In the open **gap** position, the diverter gate 42 is withdrawn from the upstream feed conveyor 98. While two diverter gates 42 are shown, any number can be used, depending on the number of masa hoppers 40 desired. Generally, every masa hopper 40, except the last in the series, has an associated diverter gate 42 mounted above it. The last masa hopper 40 does not have a

diverter gate 42 because a feed conveyor 46 terminates above it. It will be understood, however, that the last masa hopper 40 could have an associated diverter gate 42 should the diversion of masa 74 from that masa hopper 40, for recycling or other purposes, be desired. The diverter gate 42 must be driven by a device in order to move between the open and closed positions.

The selectively operable diverter gate 42 (FIGS. 6 and 6A) is driven by a pneumatic cylinder 102 which is controlled by a common programmable language controller 104 (PLC). The PLC 104 is shown as separate boxes in FIG. 5 for clarity purposes. Preferably, only one PLC 104 is needed to drive multiple diverter gates 42, however, each diverter gate 42 could have its own associated PLC 104. The PLC 104 is also connected to a photo sensor 106 positioned to sense the level of masa 74 within the masa hopper 40 and provide the corresponding signal to the PLC 104. The diverter gate 42 is connected to a pneumatic cylinder 102 mounted on the downstream feed conveyor 100. The diverter gate 42 has a generally rectangular section 108 extending across the width of the feed conveyors 98 and 100 and a smaller rectangular arm 110 protruding below the rectangular section 108. The smaller rectangular arm 110 facilitates the attachment of the diverter gate 42 to the pivot point 112 and the pneumatic cylinder 102 mounted on the side of the downstream feed conveyor 100. When the pneumatic cylinder 102 withdraws the diverter gate 42 away from the upstream feed conveyor 98, the masa logs 74 drop off of the upstream feed conveyor 98, accordingly, a structure must be provided to catch the masa logs 74.

A self feeding masa hopper 40 (FIG. 7, 8, and 9) is located beneath the end of the upstream feed conveyor 98 and catches the masa logs 74 after they have been diverted. The self feeding masa hopper 40 has a gravity feeder including side walls 113 and a curving bottom wall 114 which defines a slot 116. A pair of horizontal counter-rotating shafts 52 are mounted within the gravity feeder 50. The shafts 52 are generally parallel to each other and longitudinally straddle the slot 116, which is below the shafts 52 in the bottom wall of the gravity feeder 50. One end of each of the shafts 52 extends through the wall 118 of the masa hopper 40 to interface with drive gears 120 to be described later. The shafts 52 have rectangular projections 122 which are positioned in an alternating fashion so as to enable the projections 122 to intermesh and pass through the same space above the slot 116 as they are rotated. When the projections 122 pass above the slot 116, they drive the masa 74 through the slot 116 so it can be rolled. Accordingly, a structure must be provided to roll the masa 74.

The self feeding masa hopper 40 has a pair of horizontal primary rollers 54 to accept the masa 74 which passes through the slot 116. The primary rollers 54 have a cylindrical surface 124 and are mounted in a generally parallel, horizontally aligned relationship between two endcaps 126. The endcaps 126 prevent the masa 74 from moving horizontally, along the surface 124 of the primary rollers 54, past the ends of the primary rollers 54. The primary rollers 54 are positioned so that a gap 128 is defined between their converging surfaces 124. The gap 128 is below and aligns with the slot 116 to facilitate the travel of the masa 74 from the slot 116 through the primary rollers 54. The width of the gap 128 varies according to the food product to be produced, but is generally ¼ inch for typical tortilla production. It is to be understood that the width of the gap 128 between the primary rollers 54 of the masa hopper 40 can be varied according to the food product. Accordingly, the invention is not to be limited by the gap 128 between the primary rollers 54 of the masa hopper 40. After the masa 74 has passed through the gap 128, the masa 74 often adheres to the surfaces 124 of the primary rollers 54.

Two scrapers 130 are provided to prevent the masa 74 from adhering to the primary rollers 54. Each scraper 130 has a generally rectangular blade 132 which has a sharp point 134 that rides along the lower surface 136 of a primary roller 54 and separates any adhering masa 74. The blade 132 is made from ultra high molecular weight (UHM) copolymer plastic or any common equivalent, such as polytetrafluoroethylene. A stainless steel pivoting beam 138 is attached along the base of the blade 132 by screws (not shown) countersunk into the blade 132 material. The pivoting beam 138 has a generally square cross section, but has cylindrical ends 140. A threaded, centered hole 142 is provided on each end of the beam 138 for attachment to the masa hopper 40. Two arms 143 are perpendicularly attached to each beam 138 and extend behind the blade 132. The arms 143 are joined to the beam 138 by welding or any other common joining process. A spring 144 is connected between the end of each arm 143 and the wall 118 of the masa hopper 40, thereby providing a biasing force to keep the blade 132 riding on the lower surface 136 of the primary roller 54. Once the masa 74 has passed by the scrapers 130, it has a thickness to great for forming tortillas 60. Accordingly, the masa 74 must be compressed yet again.

Two sheeter rollers 56 are provided for compressing the masa 74 to the final thickness which is suitable for the final cutting of the tortillas 60. The sheeter rollers 56 are generally cylindrical are mounted in a generally parallel, horizontally

aligned relationship. The sheeter rollers 56 are positioned so that a gap 146 is defined between their converging surfaces 147. The gap 146 between the sheeter rollers 56 is below and aligns with the gap 128 between the primary rollers 54 to facilitate the travel of the masa 74 from the primary rollers 54 to the sheeter rollers 56. A rotary cutter (not shown) is mounted below the sheeter rollers 56 so that tortillas 60 are expelled onto the horizontal tortilla conveyor 58. The rotary cutter (not shown) is commonly available and can be adapted to cut any shape from the sheeted masa (not shown). The previously described structure, including the rotary shafts 52 and the primary rollers 54, must be driven in order to properly process the masa.

A masa hopper motor 148 (FIG. 8) drives the rotary shafts 52 and the primary rollers 54 through the drive gears 120 on the outside of the masa hopper. The masa hopper motor 148 operates on A/C current and is capable of variable speeds due to an electronic control, such as an A/C frequency inverter (not shown). A mechanical gear arrangement (not shown) may also be used to yield variable speeds. The power of the masa hopper motor 148 varies according to specific applications, but generally a 2 to 5 horse-power motor is adequate. A belt 150 connects the masa hopper motor 148 and a first gear 152 mounted on the first shaft 52. That same shaft 52 extends into the masa hopper and has the projections which compress the masa. A larger second gear 154 mounted on the same rotary shaft 52 intermeshes with a generally equally sized third gear 156 which is mounted to the other shaft 52. Another fourth gear 158 is connected to the first shaft has a belt connected to a lower, fifth gear 160. The fifth gear 160 is mounted on a primary roller axle 162, which has, in turn another, sixth gear 164, which intermeshes with yet another seventh gear 166 mounted on the other primary roller axle 168. While the sites of the sixth 164 and seventh gears 166 can be varied, a ratio of 10.333 to 4.25 is generally preferred. After having understood the interrelating structure of the masa handling system 10, the movement of the masa 74 through the system should now be described.

Generally, the preferred masa handling system 10 is intended to move masa 18 from a commonly available masa extruder 16 to the horizontal tortilla conveyor 58 leading to further food processing equipment, such as a commercial oven or fryer. Generally, masa dough 18 is used for the production of tortillas 60 having varying shapes. However, such dough can be used to produce a variety of other food products.

The process begins (FIG. 1) with the initial creation of the masa 18 in the mixer. When the masa 18 is suitably mixed, the pivoting door 14 opens and allows the attending workers to transfer the masa 18 into the extruder 16. The extruder 16 drives the masa 18 through the nozzle 22 so that a generally continuous masa stream 20 is projected up against the vertical surface 28 of the "L" shaded separator conveyor 24, which is moving upwards. The friction between the masa stream 20 and the vertical surface 28 of the "L" shaped conveyor 24 guides the masa stream 20 between the separator conveyors 24 **[andd]** **and** 26. The masa stream 20 is pulled until it fractures into masa pieces, or masa logs 74. As used herein, the term "masa logs" 74 generally refers to pieces of masa separated from the generally continuous masa stream 20, including those with a generally oval cross section. The masa logs 74 travel upward and are guided onto the horizontal portion 38 of the "L" shaped separator conveyor 24 by the **[detector]** **deflector** plate 41. The masa logs 74 then travel to the selectively operable diverter gate 42, which can either be automatically opened to allow the masa logs 74 to drop into

the masa hopper 40, or automatically closed to guide the masa logs 74 to the next feed conveyor 100, which feeds the other masa hoppers 40. The precise operation of the selectively operable diverter gate 42 will be described below. Once in the masa hopper 40, the masa 74 is compressed by the projections on the rotating shafts 52, thereby removing the gas bubbles (not shown) within the masa 74 and forcing the masa 74 into the primary rollers 54. The primary rollers 54 compress the masa 74 into a generally uniform curtain (not shown) which is fed into the sheeter rollers 56. The sheeter rollers 56 compress the masa curtain to a thickness suitable for the cutting of tortillas 60, which is accomplished by the rotary cutter (not shown). The tortillas 60 then are carried by the tortilla conveyor 58 toward the remainder of the processing system (not shown), which can contain combinations of commonly known and widely available commercial food processing apparatus (not shown), such as an oven, a cooling rack, and a packaging system. The following description will provide more detail on the operation of the elements of the masa handling system 10.

The separation of the generally continuous masa stream 20 into masa logs 74 will now be described (FIGS. 2, 3, and 4). The generally continuous masa stream 20 is forced through the nozzle 22 by the extruder. The masa stream 20 has the cross section of the nozzle 22, which is generally circular. However, it will be understood that nozzles having other cross-sectional shapes could also be used. The generally continuous masa stream 20 moves into contact with the vertical surface 28 of the "L" shaped separator conveyor 24, which is moving upwards. The friction between the vertically moving surface 28 of the "L" shaped separator conveyor 24 and the masa stream 20 causes the masa stream 20 to move upwards into contact with the moving surface 30 of the other separator conveyor 26. The masa stream 20 must next be separated into the individual masa logs 74 required for further processing.

Together, the moving surfaces 28 and 30 of the separator conveyors 24 and 26 act to separate the masa stream 20 into individual masa logs 74. The moving surfaces 28 and 30 of the separator conveyors 24 and 26 are moved by the drive rollers 66 which are, in turn, driven by the variable speed A/C motor 82. The tensioner wheel 72 is biased to provide the proper tension on the belt 70 linking the A/C motor 82 to the drive rollers 66. The speed of the A/C motor 82 is adjusted such that moving surfaces 28 and 30 of the separator conveyors 24 and 26 have an upward speed greater than that at which the masa stream 20 travels from the nozzle 22. The moving surfaces 28 and 30 grip the masa stream 20, so the masa stream 20 is carried upward at the same speed. Accordingly, the masa stream 20 is pulled from the nozzle 22 by the moving surfaces 28 and 30 of the separator conveyors 24 and 26 and is fractured into separate masa pieces, or masa logs 74. In this particular embodiment, the masa logs 74 are compressed between the separator conveyors 24 and 26 such that they have an elongated oval cross section. The general length of the masa logs 74 can be adjusted by changing the speed of the A/C motor 82. As the difference between the speed of the separator conveyors 24 and 26 and the speed at which the masa stream 20 is expelled from the nozzle 22 is increased, the length of the masa logs 74 becomes smaller.

An important advantage is provided by the previously described arrangement and operation of the nozzle 22 and the separator conveyors 24 and 26. Unlike the prior art pneumatic cutter, the masa handling system 10 has no sharp blade which could injure an attending worker. Accordingly, the masa handling system 10 advantageously avoids the

dangers associated with a sharp blade, and provides a relatively safer apparatus and method for the separation of a generally continuous masa stream 20 into masa logs 74.

Another advantage associated is associated with the trapezoidal idler rollers 86 which are mounted behind the moving surfaces 28 and 30 of the separator conveyors 24 and 26. The converging edges 88 of the moving surfaces 28 and 30 form a cradle 90 which keeps the masa logs 74 between the separator conveyors 24 and 26. As compared to an arrangement having flat moving surfaces, the masa logs 74 are less likely to fall out from between the separator conveyors 24 and 26. After the masa stream 20 is separated into masa logs 74, the masa logs 74 must be diverted to the horizontal 38, or feed, portion of the "L" shaped separator conveyor 24.

The **[detector]** **deflector** plate 41 guides the masa logs 74 onto the horizontal portion 38 of the "L" shaped separator conveyor 24. The masa logs 74 then move towards the selectively operable diverter gates 42. The photo-sensor 106 mounted adjacent to each masa hopper 40 senses the level of masa 74 therein. If the level of the masa 74 within any one masa hopper 40 drops below a predetermined level, the sensor 106 associated with that masa hopper 40 changes the state of its signal which is sent to the PLC 104. The PLC 104 then commands the pneumatic cylinder 102 to retract the diverter gate 42 located above that masa hopper 40. That diverter gate 42 pivots into an open **gap** position and the masa logs 74 then fall into **[that]** **the intermediate** masa hopper 40. The photo-sensor 106 then signals the PLC 104 when the level of masa 74 within that masa hopper 40 rises above a certain predetermined level. The PLC 104 then commands the pneumatic cylinder 102 to extend, thereby closing that diverter gate 42 and allowing the masa logs 74 to travel on to the next masa hopper **[40]** **48**.

An advantage associated with the diverter gates 42 is the corresponding labor savings due to their automatic operation. Normally, human attendants would be necessary to ensure that the masa hoppers 40 each had a proper supply of masa 74. By utilizing the photo-sensors

106, the PLC 104, and the pneumatic cylinders 102, the diverter gates 42 operate automatically and the supply of masa logs 74 within each masa hopper 40 is maintained without costly human labor. It should be understood that, while a PLC 104 is preferably used to control the diverter gates 42, a corresponding logic system having electronic relays could also be used to perform the same control functions as the PLC 104. Once the masa logs 74 have been fed to the appropriate masa hopper 40, they must be compressed to remove gas bubbles which cause voids in the rolled masa (not shown).

The self feeding masa hopper 40 compresses and removes the unwanted gas bubbles from the masa 74. The masa is fed, via gravity, to the rotating shafts 52. The projections 122 on the rotating shafts 52 compress the masa 74 and force it through the slot 116 towards the primary rollers 54. The projections 122 on the rotating shafts 52 advantageously remove gas bubbles by compressing the masa 74 without requiring any human labor. Accordingly, the costs associated with the human attendants required by the prior art masa hoppers are avoided. Once the gas bubbles are removed from the masa 74, the masa must be rolled into a generally uniform curtain (not shown).

The primary rollers 54 compress the masa 74 into the generally uniform curtain suitable for feeding to the sheeter rollers 56. Both primary rollers 54 are driven by the masa hopper A/C motor 148 and have different sized drive gears 120 so the primary rollers 54 rotate at different speeds. This

arrangement is especially advantageous because, as compared to rollers driven at the same speed, the masa 74 is less likely to stick to the lower surface of the primary rollers 54 when they rotate at different speeds. If the masa 74 sticks to the lower surface 136 of one of the primary rollers 54, it is carried around and will not be fed into the sheeter rollers 56. Accordingly, it is desirable to prevent the masa 74 from becoming stuck to the lower surface of the primary rollers 54. However, if, despite the differential speed, the masa 74 becomes stuck to one of the lower surfaces 136 of the primary toilers 54, it must be removed.

The scrapers 130 will advantageously separate the masa curtain if it becomes stuck to the lower surface 136 of one of the primary rollers 54. The springs 144 bias the blades 132 so that they ride on the lower surfaces 136 of the primary rollers 54. Accordingly, when the masa curtain becomes stuck to the lower surface 136 of one of the primary rollers 54, the blade 232 scrapes it off and it continues to travel towards the sheeter rollers 56.

The sheeter rollers 56 counter rotate at the same speed and compress the masa into its final thickness. The rotary cutter (not shown) cuts circular tortillas 60 from the masa on the underside of one of the sheeter rollers 56. The tortillas 60 then fall onto the tortilla conveyor 58 and are moved towards other food processing equipment, such as an oven.

It should be appreciated from the foregoing description that the present invention provides a masa handling system 10 having the following features: the safe separation of the masa stream 20 into individual logs 74; the automatic distribution of those logs 74 to the masa hoppers 40 requiring resupply; the automatic removal of gas bubbles from the masa within the masa hoppers; and the prevention of the masa curtain from becoming stuck to the primary rollers 54.

While a particular form of the invention has been illustrated and described, it will be apparent that various modifications can be made without departing from the spirit and scope of

the invention. Accordingly, it is not intended than the invention be limited, except as by the appended claims.

We claim:

1. A method for handling masa within a food processing system having a pair of aligned, opposed separator conveyors having facing surfaces, the longitudinal ends of the separator conveyors positioned adjacent to a nozzle connected to a masa producing device, the food processing system further having at least two masa hoppers **including an end masa hopper and an intermediate masa hopper**, the masa hoppers and the separator conveyors connected by at least two endless belt feed conveyors having upper surfaces **[moving] that are movable** in the same direction, the feed conveyors positioned in an upstream and downstream relationship relative to each other **when the feed conveyors are moving in the same direction**, at least one **[feed conveyor positioned adjacent to the other longitudinal ends of the separator conveyors, each] of the** masa **[hopper] hoppers** having an associated sensor for sensing**[, the] a** level of **masa therein, the intermediate masa hopper having [mass and]** an opening positioned below a **[diverter gate located between the feed conveyors, each diverter gate connected to] gap located between the upstream and downstream feed conveyors, the gap being controlled by** an associated mechanism **[and pivotable between an open] that provides a closed gap** position, where the masa is guided from the upstream feed conveyor to the downstream conveyor, and **an open gap [a closed]** position, where the masa is guided **from the upstream conveyor** into the **intermediate** masa hopper **positioned below the gap**, each masa hopper located adjacent to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having side walls and a bottom wall defining a slot, the masa hopper also having at least one shaft above the bottom wall, each shaft having projections, the method comprising the steps of:

moving the facing surfaces of the separator conveyors **[at equal speed]** away from the nozzle;

feeding a generally continuous masa stream through the nozzle such that the masa stream contacts at least one of the facing surfaces of the separator conveyors and is guided between the facing surfaces of the separator conveyors;

[gripping] separating the masa stream [between both facing surfaces of the separator conveyors pulling the masa stream such that the masa stream is separated] into masa logs;

feeding the masa [mass] logs onto [the upstream end of] a feed conveyor; [moving the masa logs from the separator conveyors along the upper surfaces of the feed conveyors;]

moving the masa logs along the upper surfaces of the feed conveyors;

sensing the level of masa within an associated masa hopper;

causing a signal to change its state when the level of masa within the associated masa hopper is below a predetermined level;

selectively opening and closing the [diverter gate] gap with the associated driving mechanism to control the flow of masa logs to the associated masa hopper in response to said change in signal;

placing the masa logs through the opening of one of the masa hoppers;

feeding the masa logs to at least one shaft within the masa hopper; rotating the shaft;

removing gas bubbles from the masa with the projections on at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projections on at least one shaft.

2. The method as defined by claim 1, wherein the method further comprises the [steps of;] step of:

arranging the facing surfaces of the separator conveyors to curve toward each other such that a cradle is formed to securely grip the masa.

3. The method as defined by claim 1, wherein the method further comprises the step of;

adjusting the speed of the facing surfaces of the separator conveyors to change the length of the masa logs.

[4. The method as defined in claim 1, wherein the mechanism is a pneumatic cylinder connected to a controller, the method further comprising;

programming the controller to compare said signal to a predetermined value,

selectively commanding the operation of the pneumatic cylinder to control said selective opening and closing of the diverter gate.]

5. The method as defined in claim 1, wherein said **step of** feeding **the masa logs to at least one shaft within the masa hopper** is accomplished by gravity.

6. The method as defined in claim 1, wherein said **step of** rotating **the shaft** is accomplished by an A/C motor.

7. The method as defined in claim 1, wherein the masa hopper also has a pair of opposed, horizontally, aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of;

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

8. The method as defined in claim 7, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of;

preventing the generally horizontal movement of the masa past the ends of the primary rollers.

9. The method as defined in claim 7, wherein there is a scrapper for each primary roller, each scrapper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the step of:

separating masa from the lower surface of each of the primary rollers.

10. A method for separating a stream of masa utilizing a pair of aligned, opposed separator conveyors having facing surfaces, the longitudinal ends of the separator conveyors positioned adjacent to a nozzle connected to a masa producing device, the method of separating the masa stream comprising the steps of:

moving the facing surfaces of the separator conveyors at equal speed away from the nozzle;

feeding a generally continuous masa stream through the nozzle such that the masa contacts at least one of the facing surfaces of the separator conveyors and is guided between the facing surfaces of the separator conveyors; and

gripping the masa stream between both facing surfaces of the separator conveyors, pulling the masa stream such that the masa stream is separated into masa logs.

11. The method as defined by claim 10, wherein the method further comprises the step of:

arranging the facing surfaces of the separator conveyors to curve toward each other such that a cradle is formed to securely grip the masa.

12. The method as defined by claim 11, wherein the method further comprises the step of:

adjusting the speed of the facing surfaces of the separator conveyors to change the length of the masa logs.

13. A method of feeding masa to a masa hopper within a food processing system, the food processing system further having a masa producing device and at least **an intermediate masa hopper and end masa hopper,** [**two masa hoppers,**] the masa hoppers and the masa producing device connected by **first and second** [**at least two**] endless belt feed conveyors

having upper surfaces **that are movable** [moving] in the same direction, the **first and second** feed conveyors positioned in an upstream and downstream relationship relative to each other **when the feed conveyors are moving in the same direction**, [each masa hopper] **at least one of the masa hoppers** having an associated sensor for sensing [the level of mass and] **a level of masa, the intermediate masa hopper having** an opening positioned below a [diverter gate positioned] **gap located** between the **upstream and downstream feed conveyors, the gap being controlled by** [feed conveyors, each diverter gate connected to] an associated [mechanism and pivotable between an open] **driving mechanism that provides a closed gap** position, where the masa is guided from the upstream feed conveyor to the downstream conveyor, and [a closed] **an open gap** position, where the masa is guided [into the masa hopper,] **from the upstream feed conveyor into the intermediate masa hopper positioned below the gap,** the method comprising the steps of:

moving masa logs, previously separated from a stream of masa produced from the masa producing device, along the upper surfaces of the feed conveyors;

sensing the level of masa within an associated masa hopper;

causing a signal to change its state when the level of masa within the masa hopper is below a predetermined level; and

selectively opening and closing the [diverter gate] **gap with the associated driving mechanism** to control the flow of masa logs to the masa hopper in response to said change in signal.

[14. The method of feeding masa as defined in claim 13, wherein the mechanism is a pneumatic cylinder connected to a controller, the method further comprising the steps of:

programming the controller to compare said signal to a predetermined value; and

selectively commanding the operation of the pneumatic cylinder to control said selective opening and closing of the diverter gate.]

15. A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa and side walls and a bottom wall defining a slot, the masa hopper also having at least one shaft above the bottom wall, each shaft having projections, the method comprising the steps of:

placing the masa through the opening in the masa hopper;

feeding the masa to at least one shaft;

removing gas bubbles from the masa with the projections on at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projections on at least one shaft.

16. The method for feeding masa as defined in Claim 15, wherein said feeding is accomplished by gravity.

17. The method for feeding masa as defined in Claim 15, wherein said rotating is accomplished by a motor.

18. The method for feeding masa defined in Claim [17] <u>20</u>, wherein there is a scrapper for each primary roller, each scrapper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the steps of:.

separating masa from the lower surface of each of the primary rollers.

19. The method for feeding masa as defined in claim 15, wherein the masa hopper also has a pair of opposed, horizontally, aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

20. The method for feeding masa as defined in claim 19, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing the movement of the masa past the ends of the primary rollers.

21. The method as defined in claim 1 wherein the upstream and downstream conveyors are operating in a fixed location and wherein the step of selectively opening and closing the gap with the associated driving mechanism comprises the step of moving a driven structure that is separate from the upstream and downstream feed conveyors.

22. The method as defined in claim 21 wherein the driven structure is a diverter gate positioned in the gap between the upstream and downstream feed conveyors, and wherein the step of moving the driven structure comprises moving the diverter gate between an open gap position and a closed gap position.

23. The method as defined in claim 21 wherein the associated driving mechanism is a pneumatic cylinder connected to the driven structure, the method further comprising the steps of:

connecting a controller to the pneumatic cylinder;

programming the controller to compare the signal to a predetermined value; and

selectively commanding the operation of the pneumatic cylinder to control the selective opening and closing of the gap.

24. The method of feeding masa as defined in claim 13 wherein the step of selectively opening and closing the gap with the associated driving mechanism comprises the step of moving a driven structure that is separate from the feed conveyors.

25. The method of feeding masa as defined in claim 24 wherein the moveable structure is a diverter gate positioned between adjacent ends of the upstream feed conveyor and the downstream feed conveyor, and wherein the step of moving the driven structure comprises the step of moving the diverter gate between an open gap position and a closed gap position.

26. The method of feeding masa as defined in claim 24 wherein the associated driving mechanism is a pneumatic cylinder connected to the driven structure, the method further comprising the steps of:

connecting a controller to the pneumatic cylinder;

programming the controller to compare the signal to a predetermined value; and

selectively commanding the operation of the pneumatic cylinder to control said selective opening and closing of the gap.

27. A method for handling masa within a food processing system having a source of masa logs positioned adjacent to a nozzle connected to a masa producing device, the food processing system further having at least two masa hoppers including an end masa hopper and an intermediate masa hopper, the masa hoppers and the source of masa logs connected by a first and second endless belt feed conveyor having upper surfaces, the feed conveyors positioned in an upstream and downstream relationship relative to each other, each masa hopper located adjacent to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having side walls and a bottom wall defining a slot, the masa hopper

also having at least one shaft above the bottom wall, each shaft having projections, the method comprising the steps of:

feeding the masa logs from the source of masa logs onto the first feed conveyor;

moving the masa logs along the upper surface of the first feed conveyor;

selectively controlling the flow of masa logs to an associated masa hopper;

placing the masa logs through the opening of the associated masa hopper;

feeding the masa logs to at least one shaft within the associated masa hopper;

rotating the shaft;

removing gas bubbles from the masa with the projections on at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projections on at least one shaft.

28. The method as defined in claim 27 wherein the step of selectively controlling the flow of masa logs to the associated masa hopper comprises opening and closing a gap between the first feed conveyor and the second feed conveyor; the gap positioned above the intermediate masa hopper.

29. The method as defined in claim 28 wherein the step of opening and closing the gap between the first and second feed conveyor comprises moving a driven structure that is separate from the first and second feed conveyor.

30. The method as defined in claim 29 wherein the driven structure is a diverter gate positioned between adjacent ends of the first and second feed conveyor, and wherein the step of moving a driven structure comprises opening and closing the diverter gate.

31. The method as defined in claim 27 further comprising the step of sensing a level of masa within the associated masa hopper.

32. The method as defined in claim 31 further comprising the step of causing a signal to change its state when the level of masa within the associated masa hopper is below a predetermined level.

33. The method as defined in claim 32 wherein the step of selectively controlling the flow of masa logs to the associated masa hopper comprises the step of selectively opening and closing a gap positioned between the first and second feed conveyor and above the intermediate masa hopper, said opening and closing of the gap resulting from said change in signal.

34. A method of feeding masa to a masa hopper within a food processing system, the food processing system further having a masa producing device, an intermediate masa hopper, and an end masa hopper, the masa hoppers and the masa producing device connected by an upstream and a downstream endless belt feed conveyor, each conveyor having an upper surface, the intermediate masa hopper positioned below a gap defined between the upstream and downstream feed conveyor, the gap being adjustable between a closed gap position where the masa is guided from the upstream conveyor to the downstream feed conveyor, and an open position where the masa is guided into the intermediate masa hopper below the gap, the method comprising the steps of:

moving masa logs along the upper surface of the first feed conveyor; and

selectively opening and closing the gap to control the flow of masa logs to the intermediate hopper positioned below the gap.

35. The method as defined in claim 34 further comprising the step of sensing a level of masa within an associated masa hopper.

36. The method as defined in claim 35 further comprising the step of causing a signal to change its state when the level of masa within the associated masa hopper is below a predetermined level.

37. The method as defined in claim 36 wherein the step of selectively opening and closing the gap comprises selectively opening and closing the gap in response to said change in signal.

38. A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa, walls, and a bottom wall defining] a slot, the masa hopper also having at least one shaft above the slot, each shaft having a projection, the method comprising the steps of:

placing the masa through the opening in the masa hopper;

feeding the masa to at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projection on at least one shaft.

39. The method for feeding masa defined in Claim 38 comprising the further step of:

removing gas bubbles from the masa with the projection on at least one shaft.

40. The method for feeding masa as defined in Claim 38, wherein said feeding is accomplished by gravity.

41. The method for feeding masa as defined in Claim 38, wherein said rotating is accomplished by a motor.

42. The method for feeding masa as defined in claim 38, wherein the masa hopper also has a pair of opposed, horizontally, aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

43. The method for feeding masa defined in Claim 42, wherein there is a scraper for each primary roller, each scraper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the step of:

separating masa from the lower surface of each of the primary rollers.

44. The method for feeding masa as defined in claim 42, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing the movement of the masa past the ends of the primary rollers.

45. A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa, walls, and a bottom wall defining] a slot, the masa hopper also having at least one shaft above the slot, each shaft having a projection, the method comprising the steps of:

placing the masa through the opening in the masa hopper;

feeding the masa to at least one shaft; and

removing gas bubbles from the masa with the projection on at least one shaft.

46. The method for feeding masa defined in Claim 45 comprising the further step of:

forcing the masa through the slot, toward the sheeter rollers, with the projection on at least one shaft.

47. The method for feeding masa as defined in Claim 45, wherein said feeding is accomplished by gravity.

48. The method for feeding masa as defined in Claim 45, wherein said rotating is accomplished by a motor.

49. The method for feeding masa as defined in claim 45, wherein the masa hopper also has a pair of opposed, horizontally, aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

50. The method for feeding masa defined in Claim 49, wherein there is a scraper for each primary roller, each scraper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the step of:

separating masa from the lower surface of each of the primary rollers.

51. The method for feeding masa as defined in claim 49, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing the movement of the masa past the ends of the primary rollers.

52. A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa, walls, and a bottom wall defining] a slot, the masa hopper also having at least one shaft above the slot, each shaft having a projection, the method comprising the steps of:

placing the masa through the opening in the masa hopper;

feeding the masa to at least one shaft;

removing gas bubbles from the masa with the projection on at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projection on at least one shaft.

53. The method for feeding masa as defined in Claim 52, wherein said feeding is accomplished by gravity.

54. The method for feeding masa as defined in Claim 52, wherein said rotating is accomplished by a motor.

55. The method for feeding masa as defined in claim 52, wherein the masa hopper also has a pair of opposed, horizontally, aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

56. The method for feeding masa defined in Claim 55, wherein there is a scraper for each primary roller, each scraper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the step of:

separating masa from the lower surface of each of the primary rollers.

57. The method for feeding masa as defined in claim 55, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing the movement of the masa past the ends of the primary rollers.

FIG. 1

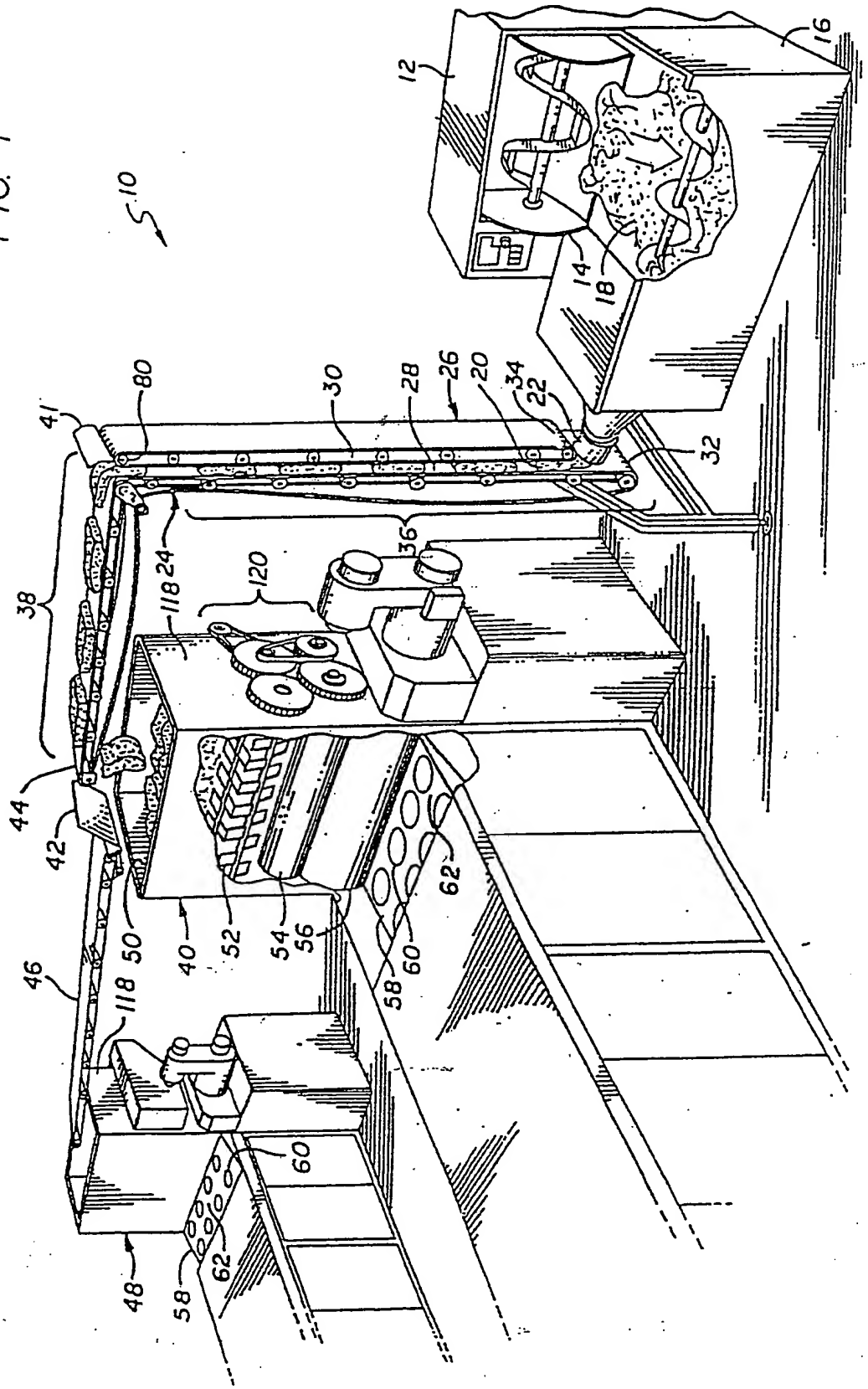

10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
41
42
44
46
48
50
52
54
56
58
60
62
80
118
120

FIG. 2

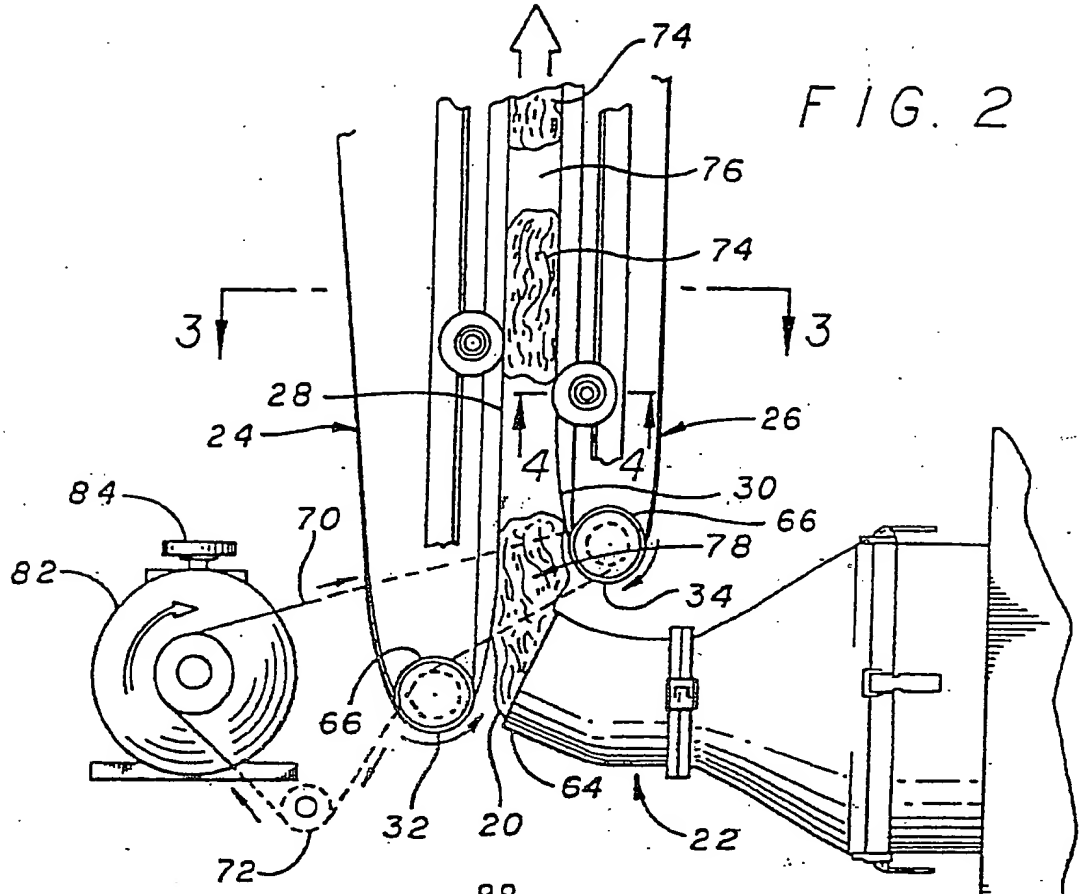


FIG. 3

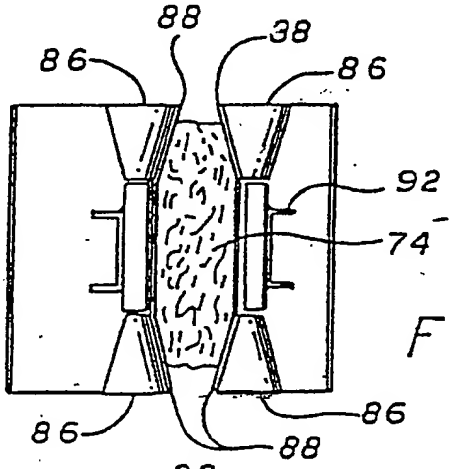
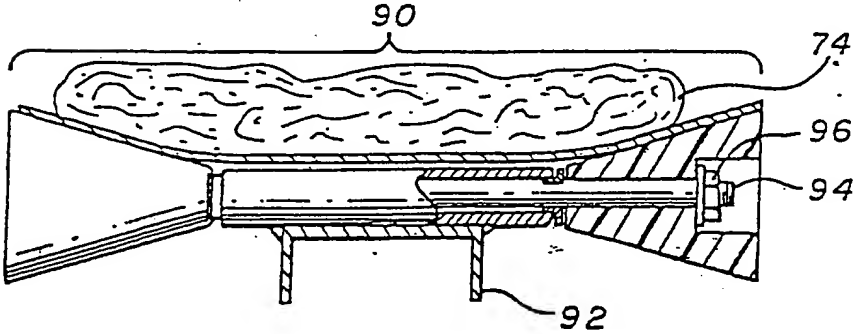


FIG. 4



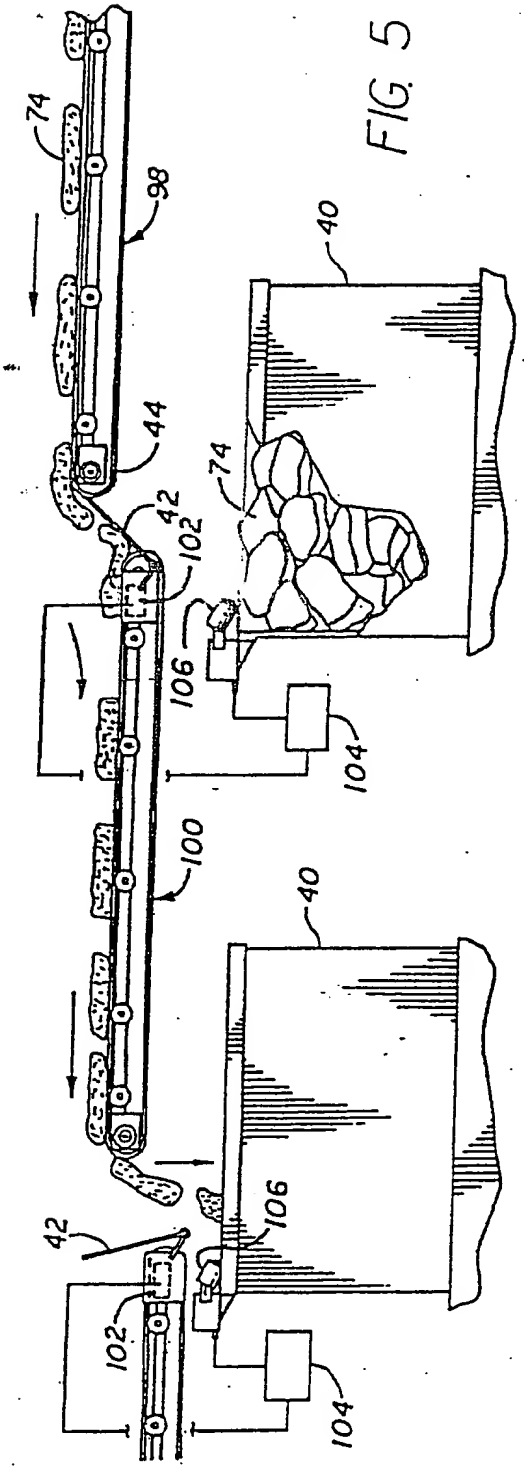


FIG. 5

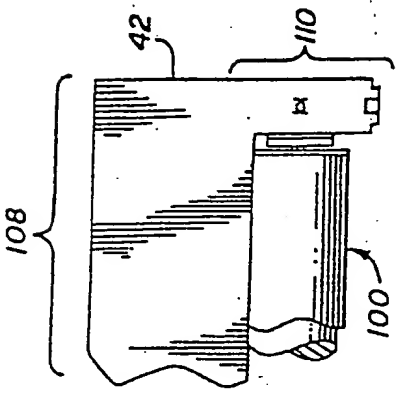


FIG. 6A

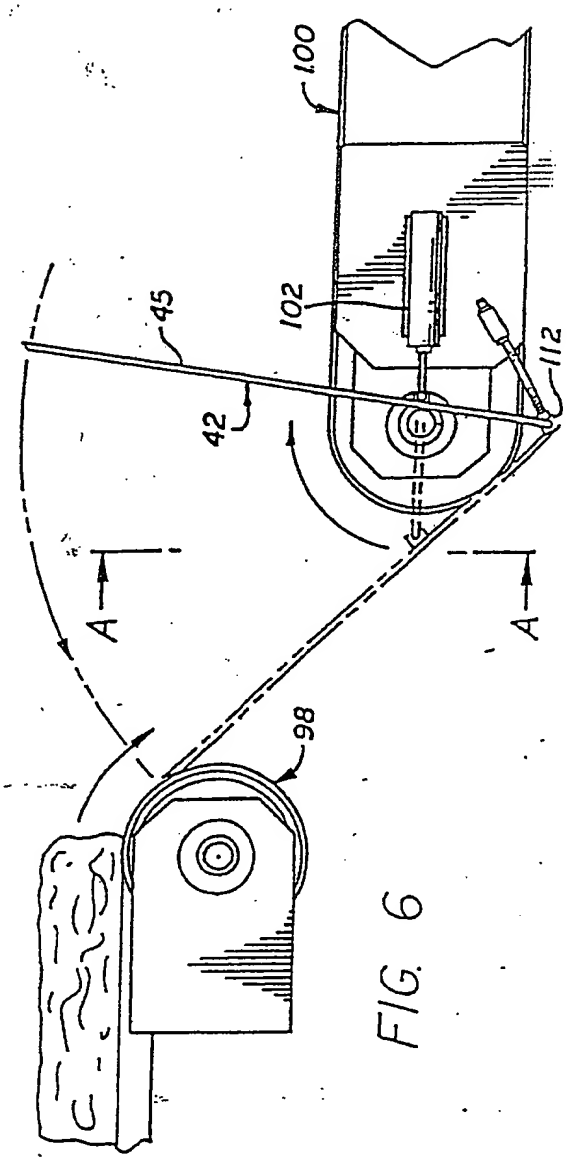


FIG. 6

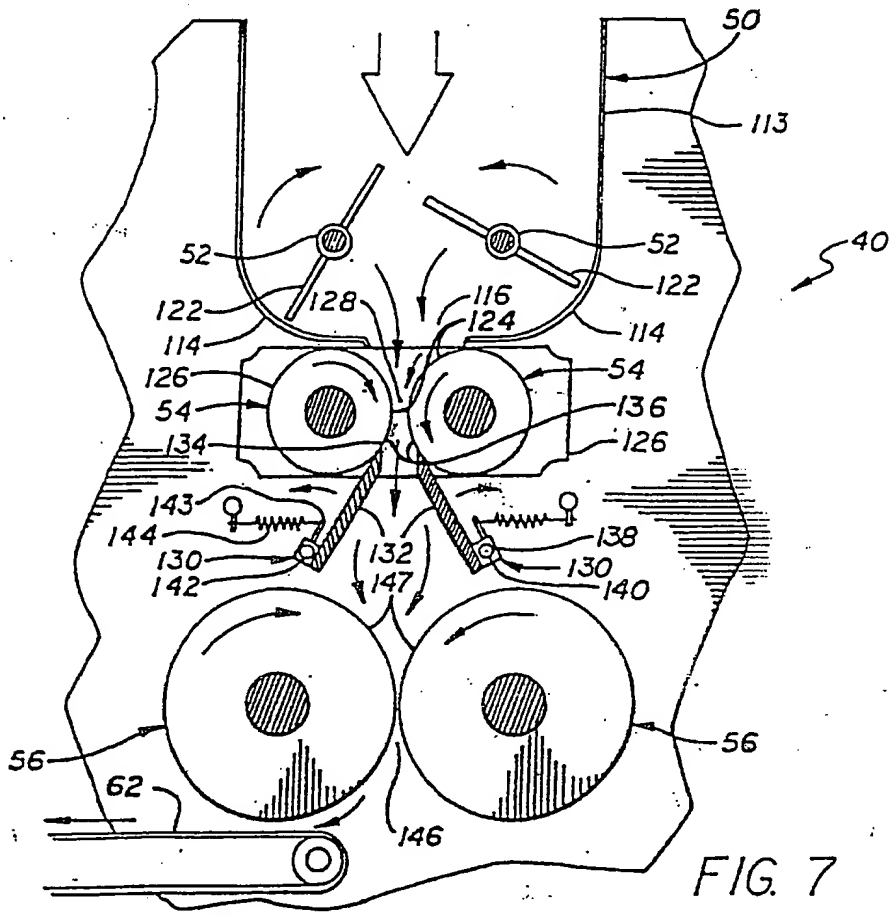


FIG. 7

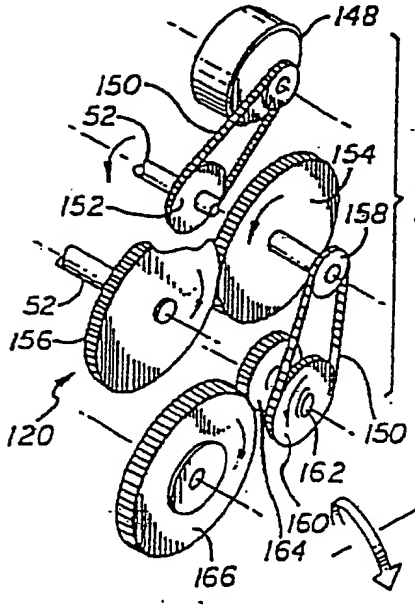


FIG. 8

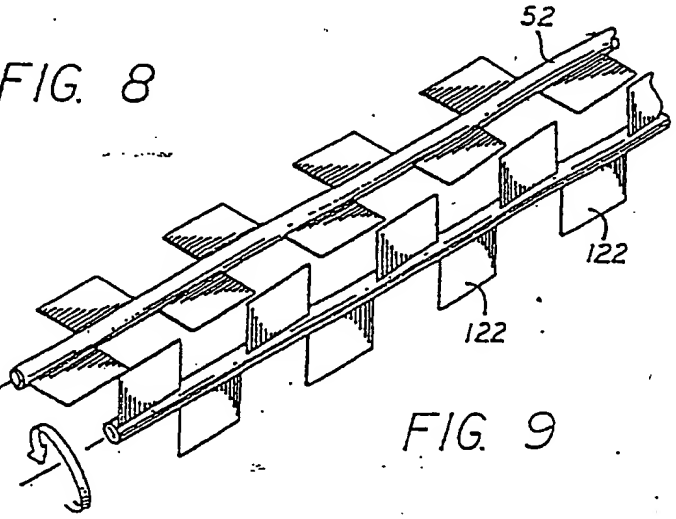


FIG. 9

Docket No. CAS1PAU24R2 **Reissue Application**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue of:	Examiner: Milton I. Cano
Sanchez et al.	Group Art Unit: 1761
Patent No.: 5,635,235 Date of Patent: June 3, 1997	
Serial No.:	Costa Mesa, California
For: METHODS FOR HANDLING MASA	September 20, 2000

PRELIMINARY AMENDMENT
SUBMITTED WITH CONTINUATION REISSUE APPLICATION

BOX REISSUE
Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Please enter the following amendments before substantively reviewing the herein filed continuation reissue application.

In the Specification

In the "Related U.S. Application Data" section, please insert - -This continuation reissue application is a continuation of reissue application no. 09/325,122, which application has been allowed and will soon issue as reissued patent no. RE37008. - -

In the Claims:

Please cancel Claims 1-37 without prejudice.

Remarks

The herein submitted continuation reissue application is being filed prior to the issuance of RE37008 which will soon result from the filing of the parent reissue application no. 09/325,122. The assignee intends to file a cross-reference to this continuation reissue application in reissued patent no. RE37008 by requesting a Certificate of Correction as suggested in MPEP 1451.

The accompanying specification and claims, submitted in column copy format, include Claims 38-57 that are comparable to Claims 15-20 of the original U.S. Patent No. 5,635,235. The primary difference is that the preamble of Claims 38-57 do not describe the hopper as having a "side wall" and a "bottom wall". Additionally, base claim 38 includes a "forcing" step but not a "removing gas bubbles" step, base claim 45 includes a "removing gas bubbles" step but not a "forcing" step, and base claim 52 includes both steps as set forth in original base Claim 15. Finally, Claims 38-57 now specify a "projection" rather than "projections".

The Examiner is invited to telephone the undersigned attorney if it appears that a telephone conference would further this case in any way.

Respectfully submitted,

Joseph C. Andras
Registration No. 33,469
Myers, Dawes & Andras LLP
650 Town Center Drive, Suite 650
Costa Mesa, CA 92626
(714) 444-1199

PTO/SB/56 (08-00)
Approved for use through 12/30/2000. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REISSUE APPLICATION FEE TRANSMITTAL FORM

Docket Number (Optional): CAS1PAU24R2

Claims as Filed - Part 1

Claims in Patent		Number Filed in Reissue Application	(3) Number Extra	Small Entity Rate	Small Entity Fee		Other than a Small Entity Rate	Other than a Small Entity Fee
(A) 20	Total Claims (37 CFR 1.16(j))	(B) 20	**** 0 =	x $ 18 =	0	or	x $ ____ =	
(C) 3	Independent claims (37 CFR 1.16(i))	(D) 3	* 0 =	x $ 80 =	0		x $ ____ =	
				Basic Fee (37 CFR 1.16(h))	$ 355			$ ____
				Total Filing Fee	$ 355		OR	$

Claims as Amended - Part 2

	(1) Claims Remaining After Amendment		(2) Highest Number Previously Paid For	(3) Extra Claims Present	Small Entity Rate	Small Entity Fee		Other than a Small Entity Rate	Other than a Small Entity Fee
Total Claims (37 CFR 1.16(j))	***	MINUS	**	* =	x $ ____ =			x $ ____ =	
Independent Claims (37 CFR 1.16(i))	***	MINUS	*****	=	x $ ____ =			x $ ____ =	
					Total Additional Fee	$		OR	$

* If the entry in (D) is less than the entry in (C), Write "0" in column 3.

** If the "Highest Number of Total Claims Previously Paid For" is less than 20, Write "20" in this space.

*** After any cancellation of claims.

**** If "A" is greater than 20, use (B - A); if "A" is 20 or less, use (B - 20).

***** "Highest Number of Independent Claims Previously Paid For" or Number of Independent Claims in Patent (C).

☑ Applicant claims small entity status. See 37 CFR 1.27.

☐ Please charge Deposit Account No. _____ in the amount of _____.
A duplicate copy of this sheet is enclosed.

☑ The Commissioner is hereby authorized to charge any additional fees under 37 CFR 1.16 or 1.17 which may be required, or credit any overpayment to Deposit Account No. 01-1960.
A duplicate copy of this sheet is enclosed.

☑ A check in the amount of $ 355 to cover the filing / additional fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

12-29-2000
Date

Signature of Applicant, Attorney or Agent of Record

Joseph C. Andras, Reg. No. 33,469
Typed or printed name

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

Docket No. CAS1PAU24R2

Reissue Application

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue of:	Examiner: Milton I. Cano
Sanchez et al.	Group Art Unit: 1761
Patent No.: 5,635,235	
Date of Patent: June 3, 1997	Irvine, California
Serial No.: 09/753,171	May 4, 2001
Filed: December 29, 2000	
For: METHODS FOR HANDLING MASA	

SUBSTITUTE PRELIMINARY AMENDMENT

BOX REISSUE
Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

This Substitute Preliminary Amendment is being provided with the Substitute Reissue Specification submitted in response to the Notice to File Missing Parts. Please disregard the initially filed document entitled "Preliminary Amendment Submitted With Continuation Reissue Application" and use this document that is intended to conform with the new rules.

In the Specification

In the "Related U.S. Application Data" section, please insert - -This continuation reissue application is a continuation of reissue application no. 09/325,122, filed on June 3, 1999

and issued as reissued patent no. RE37008, which application is a reissue application of application no. 08/476,198 filed on June 7, 1995, and issued as Patent no. 5,635,235, which application is a divisional application of 08/192,458 filed on February 7, 1994 and issued as Patent no. 5,592,870."

. Replace the paragraph beginning at column 5, line 49 with the following:

The preferred masa handling system 10 (FIG.1) is a part of a larger arrangement of apparatus intended for the commercial production of tortillas or other food having a masa dough as an ingredient. The general arrangement of the preferred masa handling system 10 will now be described. A commonly available commercial mixer 12 is located at the beginning of the production line. The mixer 12 has a pivoting door 14 which can rotate downward towards a masa 18 and feeds a generally continuous masa stream 20 through a nozzle 22. Two vertically opposed and aligned endless belt separator conveyors 24 and 26 have moving surfaces 28 and 30 which face each other. The longitudinal ends 32 and 34 of separator conveyors 24 and 26 are mounted adjacent to the nozzle 22. One of the two separator conveyors 24 is "L" shaded and has vertical section, or vertical portion, 36 and a horizontal section, or horizontal portion, 38 which terminates above **[a]** **an intermediate** masa hopper 40 **that is in between two feed conveyors as shown in Fig. 1**. The vertical section 34 of the "L" shaped separator conveyor 24 extends longitudinally below the longitudinal end of the other separator conveyor, thereby providing a moving surface opposite from the nozzle 22. A deflector plate 41 is mounted on the end of the other separator conveyor 26. The previously

discussed separator conveyors 24 and 26 move the masa 18 to the ~~first~~ **intermediate** masa hopper 40. ~~That~~ The masa [18] hopper 40 must be supplied with masa 18 periodically.

Replace the paragraph beginning at column 6, line 9 with the following:

A selectively operable diverter gate, for periodically allowing resupply of the masa hopper 40, is located **[adjacent to the end 44 of]** **in a gap between an upstream feed conveyor** [the horizontal section 38 of the "L" shaped separator conveyor 24] **as shown in Fig. (1) and a downstream feed conveyor 46**. The diverter gate 42 is shown in its open **gap** position. However, when the diverter gate 42 is **[closed]** **in a closed gap position**, its top surface 45 forms a gravity slide that feeds to a horizontal **downstream** feed conveyor 46, which, in turn, feeds another masa hopper **which, as shown Fig. 1, may be an end masa hopper** 48. It will be understood that while two masa hoppers 40 and 48 are shown the masa handling system 10 can be adapted for use with any number of masa hoppers. Therefore, the invention is not limited by the number of masa hoppers.

Replace the paragraph beginning at column 7, line 21 with the following:

The selectively operable diverter gate 42 (FIG. 5) is mounted **in a gap** between an upstream 98 and a downstream 100 endless belt feed conveyor and guides the masa logs 74 to the appropriate masa hopper. The feed conveyors 98 and 100 are positioned end to end **thereby forming the gap between them (as shown in Fig. 5)**, and are vertically spaced so that the masa logs 74 can move from one feed conveyor 98 and 100 to the next, in series. The diverter **[gaze]** **gate** 42 is pivotally mounted on

the downstream feed conveyor 100 and, in the closed **gap** position, extends to the end of the upstream feed conveyor 98 thereby **closing the gap by** forming a gravity slide between the two feed conveyors 98 and 100. In the open **gap** position, the diverter gate 42 is withdrawn from the upstream feed conveyor 98. While two diverter gates 42 are shown, any number can be used, depending on the number of masa hoppers 40 desired. Generally, every masa hopper 40, except the last in the series, has an associated diverter gate 42 mounted above it. The last masa hopper 40 does not have a diverter gate 42 because a feed conveyor 46 terminates above it. It will be understood, however, that the last masa hopper 40 could have an associated diverter gate 42 should the diversion of masa 74 from that masa hopper 40, for recycling or other purposes, be desired. The diverter gate 42 must be driven by a device in order to move between the open and closed positions.

Replace the paragraph beginning at column 9, line 48 with the following:

The process begins (FIG. 1) with the initial creation of the masa 18 in the mixer. When the masa 18 is suitably mixed, the pivoting door 14 opens and allows the attending workers to transfer the masa 18 into the extruder 16. The extruder 16 drives the masa 18 through the nozzle 22 so that a generally continuous masa stream 20 is projected up against the vertical surface 28 of the "L" shaded separator conveyor 24, which is moving upwards. The friction between the masa stream 20 and the vertical surface 28 of the "L" shaped conveyor 24 guides the masa stream 20 between the separator conveyors 24 **[andd]** **and** 26. The masa stream 20 is pulled until it fractures into masa pieces, or masa logs 74. As used herein, the term "masa logs" 74 generally

refers to pieces of masa separated from the generally continuous masa stream 20, including those with a generally oval cross section. The masa logs 74 travel upward and are guided onto the horizontal portion 38 of the "L" shaped separator conveyor 24 by the **[detector]** **deflector** plate 41. The masa logs 74 then travel to the selectively operable diverter gate 42, which can either be automatically opened to allow the masa logs 74 to drop into

Replace the paragraph beginning at column 11, line 16 with the following:

The **[detector]** **deflector** plate 41 guides the masa logs 74 onto the horizontal portion 38 of the "L" shaped separator conveyor 24. The masa logs 74 then move towards the selectively operable diverter gates 42. The photo-sensor 106 mounted adjacent to each masa hopper 40 senses the level of masa 74 therein. If the level of the masa 74 within any one masa hopper 40 drops below a predetermined level, the sensor 106 associated with that masa hopper 40 changes the state of its signal which is sent to the PLC 104. The PLC 104 then commands the pneumatic cylinder 102 to retract the diverter gate 42 located above that masa hopper 40. That diverter gate 42 pivots into an open **gap** position and the masa logs 74 then fall into **[that]** **the intermediate** masa hopper 40. The photo-sensor 106 then signals the PLC 104 when the level of masa 74 within that masa hopper 40 rises above a certain predetermined level. The PLC 104 then commands the pneumatic cylinder 102 to extend, thereby closing that diverter gate 42 and allowing the masa logs 74 to travel on to the next masa hopper **[40]** **48**.

In the Claims:

Amend Claim 1 as follows:

1. A method for handling masa within a food processing system having a pair of aligned, opposed separator conveyors having facing surfaces, the longitudinal ends of the separator conveyors positioned adjacent to a nozzle connected to a masa producing device, the food processing system further having at least two masa hopper **including an end masa hopper and an intermediate masa hopper**, the masa hoppers and the separator conveyors connected by at least two endless belt feed conveyors having upper surfaces **[moving] that are movable** in the same direction, the feed conveyors positioned in an upstream and downstream relationship relative to each other **when the feed conveyors are moving in the same direction**, at least one **[feed conveyor positioned adjacent to the other longitudinal ends of the separator conveyors, each]** of the masa **[hopper] hoppers** having an associated sensor for sensing**[, the] a** level of **masa therein, the intermediate masa hopper having [mass and]** an opening positioned below a **[diverter gate located between the feed conveyors, each diverter gate connected] gap located between the upstream and downstream feed conveyors, the gap being controlled by** an associated mechanism **[and pivotable between an open] that provides a closed gap** position, where the masa is guided from the upstream feed conveyor to the downstream conveyor, and **an open gap [a closed]** position, where the masa is guided **from the upstream conveyor** into the **intermediate** masa hopper **positioned below the gap**, each masa hopper located adjacent to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having side walls and a bottom wall defining a slot, the masa

hopper also having at least one shaft above the bottom wall, each shaft having projections, the method comprising the steps of:

moving the facing surfaces of the separator conveyors **[at equal speed]** away from the nozzle,

feeding a generally continuous masa stream through the nozzle such that the masa stream contacts at least one of the facing surfaces of the separator conveyors and is guided between the facing surfaces of the separator conveyors;

[gripping] **separating** the masa stream **[between both facing surfaces of the separator conveyors pulling the masa stream such that the masa stream is separated]** into masa logs;

feeding the **masa** **[mass]** logs onto **[the upstream end of]** a feed conveyor;

[moving the masa logs from the separator conveyors along the upper surfaces of the feed conveyors;]

moving the masa logs along the upper surfaces of the feed conveyors;

sensing the level of masa within an associated masa hopper;

causing a signal to change its state when the level of masa within the **associated** masa hopper is below a predetermined level;

selectively opening and closing the **[diverter gate]** **gap with the associated driving mechanism** to control the flow of masa logs to the **associated** masa hopper in response to said change in signal;

placing the masa logs through the opening of one of the masa hoppers;

feeding the masa logs to at least one shaft within the masa hopper; rotating the shaft; removing gas bubbles from the masa with the projections on at least one shaft; and forcing the masa through the slot, toward the sheeter rollers, with the projections on at least one shaft.

Amend Claim 2 as follows:

2. The method as defined by claim 1, wherein the method further comprises the **[steps of;]** **step of:**

arranging the facing surfaces of the separator conveyors to curve toward each other such that a cradle is formed to securely grip the masa.

Cancel Claim 4.

Amend Claim 5 as follows:

5. The method as defined in claim 1, wherein said **step of** feeding **masa logs to at least one shaft within the masa hopper** is accomplished by gravity.

Amend Claim 6 as follows:

6. The method as defined in claim 1, wherein said **step of** rotating **the shaft** is accomplished by an A/C motor.

Amend Claim 13 as follows:

13. A method of feeding masa to **a** masa hopper within a food processing system, the food processing system further having a masa producing device and at least **an intermediate masa hopper and end masa hopper, [two masa hoppers,]** the masa hoppers and the masa producing device connected by **first and second [at least two]** endless belt feed conveyors having upper surfaces **that are movable [moving]** in the same direction, the **first and second** feed conveyors positioned in an upstream and downstream relationship relative to each other **when the feed conveyors are moving in the same direction, [each masa hopper] at least one of the masa hoppers** having an associated sensor for sensing **[the level of mass and] a level of masa, the intermediate masa hopper having** an opening positioned below a **[diverter gate positioned] gap located** between the **upstream and downstream feed conveyors, the gap being controlled by [feed conveyors, each diverter gate connected to]** an associated **[mechanism and pivotable between an open] driving mechanism that provides a closed gap** position, where the masa is guided from the upstream feed conveyor to the downstream conveyor, and **[a closed] an open gap** position, where the masa is guided **[into the masa hopper,] from the upstream feed conveyor into the intermediate masa hopper positioned below the gap,** the method comprising the steps of:

moving masa logs, previously separated from a stream of masa produced from the masa-producing device, along the upper surfaces of the feed conveyors;

sensing the level of masa within an associated masa hopper;

causing a signal to change its state when the level of masa within the masa hopper is below a predetermined level; and

selectively opening and closing the **[diverter gate]** **gap with the associated driving mechanism** to control the flow of masa logs to the masa hopper in response to said change in signal.

Cancel Claim 14.

Amend Claim 18 as follows:

18. The method for feeding masa defined in Claim **[17]** **20**, wherein there is a scrapper for each primary roller, each scrapper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the steps of:.

separating masa from the lower surface of each of the primary rollers.

Please cancel the above Claims 1 - 18 without prejudice

Please add and then immediately cancel new Claims 21 - 37 without prejudice:

21. The method as defined in claim 1 wherein the upstream and downstream conveyors are operating in a fixed location and wherein the step of selectively opening and closing the gap with the associated driving mechanism comprises the step of moving a driven structure that is separate from the upstream and downstream feed conveyors.

22. The method as defined in claim 21 wherein the driven structure is a diverter gate positioned in the gap between the upstream and downstream feed conveyors, and wherein the step of moving the driven structure comprises moving the diverter gate between an open gap position and a closed gap position.

23. The method as defined in claim 21 wherein the associated driving mechanism is a pneumatic cylinder connected to the driven structure, the method further comprising the steps of:

connecting a controller to the pneumatic cylinder;

programming the controller to compare the signal to a predetermined value; and

selectively commanding the operation of the pneumatic cylinder to control the selective opening and closing of the gap.

24. The method of feeding masa as defined in claim 13 wherein the step of selectively opening and closing the gap with the associated driving mechanism comprises the step of moving a driven structure that is separate from the feed conveyors.

25. The method of feeding masa as defined in claim 24 wherein the moveable structure is a diverter gate positioned between adjacent ends of the upstream feed conveyor and the downstream feed conveyor, and wherein the step of moving the

25. The method of feeding masa as defined in claim 24 wherein the moveable structure is a diverter gate positioned between adjacent ends of the upstream feed conveyor and the downstream feed conveyor, and wherein the step of moving the driven structure comprises the step of moving the diverter gate between an open gap position and a closed gap position.

26. The method of feeding masa as defined in claim 24 wherein the associated driving mechanism is a pneumatic cylinder connected to the driven structure, the method further comprising the steps of:

connecting a controller to the pneumatic cylinder;

programming the controller to compare the signal to a predetermined value; and

selectively commanding the operation of the pneumatic cylinder to control said selective opening and closing of the gap.

27. A method for handling masa within a food processing system having a source of masa logs positioned adjacent to a nozzle connected to a masa producing device, the food processing system further having at least two masa hoppers including an end masa hopper and an intermediate masa hopper, the masa hoppers and the source of masa logs connected by a first and second endless belt feed conveyor having upper surfaces, the feed conveyors positioned in an upstream and downstream relationship relative to each other, each masa hopper located adjacent to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having side walls and a bottom wall defining a slot, the masa hopper also having at least one shaft above the bottom wall, each shaft having projections, the method comprising the steps of:

feeding the masa logs from the source of masa logs onto the first feed conveyor;

moving the masa logs along the upper surface of the first feed conveyor;

selectively controlling the flow of masa logs to an associated masa hopper;

placing the masa logs through the opening of the associated masa hopper;

feeding the masa logs to at least one shaft within the associated masa hopper;

rotating the shaft;

removing gas bubbles from the masa with the projections on at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projections on at least one shaft.

28. The method as defined in claim 27 wherein the step of selectively controlling the flow of masa logs to the associated masa hopper comprises opening and closing a gap between the first feed conveyor and the second feed conveyor; the gap positioned above the intermediate masa hopper.

29. The method as defined in claim 28 wherein the step of opening and closing the gap between the first and second feed conveyor comprises moving a driven structure that is separate from the first and second feed conveyor.

30. The method as defined in claim 29 wherein the driven structure is a diverter gate positioned between adjacent ends of the first and second feed conveyor, and wherein the step of moving a driven structure comprises opening and closing the diverter gate.

31. The method as defined in claim 27 further comprising the step of sensing a level of masa within the associated masa hopper.

32. The method as defined in claim 31 further comprising the step of causing a signal to change its state when the level of masa within the associated masa hopper is below a predetermined level.

33. The method as defined in claim 32 wherein the step of selectively controlling the flow of masa logs to the associated masa hopper comprises the step of selectively opening and closing a gap positioned between the first and second feed conveyor and above the intermediate masa hopper, said opening and closing of the gap resulting from said change in signal.

34. A method of feeding masa to a masa hopper within a food processing system, the food processing system further having a masa producing device, an intermediate masa hopper, and an end masa hopper, the masa hoppers and the masa producing device connected by an upstream and a downstream endless belt feed conveyor, each conveyor having an upper surface, the intermediate masa hopper positioned below a gap defined between the upstream and downstream feed conveyor, the gap being adjustable between a closed gap position where the masa is guided from the upstream conveyor to the downstream feed conveyor, and an open position where the masa is guided into the intermediate masa hopper below the gap, the method comprising the steps of:

moving masa logs along the upper surface of the first feed conveyor; and

selectively opening and closing the gap to control the flow of masa logs to the intermediate hopper positioned below the gap.

35. The method as defined in claim 34 further comprising the step of sensing a level of masa within an associated masa hopper.

36. The method as defined in claim 35 further comprising the step of causing a signal to change its state when the level of masa within the associated masa hopper is below a predetermined level.

37. The method as defined in claim 36 wherein the step of selectively opening and closing the gap comprises selectively opening and closing the gap in response to said change in signal.

Please add Claims 38 – 57 as follows:

38. A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa, walls, and a bottom wall defining a slot, the masa hopper also having at least one shaft above the slot, each shaft having a projection, the method comprising the steps of:

placing the masa through the opening in the masa hopper;

feeding the masa to at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projection on at least one shaft.

39. The method for feeding masa defined in Claim 38 comprising the further step of:

removing gas bubbles from the masa with the projection on at least one shaft.

40. The method for feeding masa as defined in Claim 38, wherein said feeding is accomplished by gravity.

41. The method for feeding masa as defined in Claim 38, wherein said rotating is accomplished by a motor.

42. The method for feeding masa as defined in claim 38, wherein the masa hopper also has a pair of opposed, horizontally aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

43. The method for feeding masa defined in Claim 42, wherein there is a scraper for each primary roller, each scraper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the step of:

separating masa from the lower surface of each of the primary rollers.

44. The method for feeding masa as defined in claim 42, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing the movement of the masa past the ends of the primary rollers.

45. A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa, walls, and a bottom wall defining a slot, the masa hopper also having at least

one shaft above the slot, each shaft having a projection, the method comprising the steps of:

placing the masa through the opening in the masa hopper;

feeding the masa to at least one shaft; and

removing gas bubbles from the masa with the projection on at least one shaft.

46. The method for feeding masa defined in Claim 45 comprising the further step of:

forcing the masa through the slot, toward the sheeter rollers, with the projection on at least one shaft.

47. The method for feeding masa as defined in Claim 45, wherein said feeding is accomplished by gravity.

48. The method for feeding masa as defined in Claim 45, wherein said rotating is accomplished by a motor.

49. The method for feeding masa as defined in claim 45, wherein the masa hopper also has a pair of opposed, horizontally aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

50. The method for feeding masa defined in Claim 49, wherein there is a scraper for each primary roller, each scraper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the step of:

separating masa from the lower surface of each of the primary rollers.

51. The method for feeding masa as defined in claim 49, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing the movement of the masa past the ends of the primary rollers.

52. A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa, walls, and a bottom wall defining a slot, the masa hopper also having at least one shaft above the slot, each shaft having a projection, the method comprising the steps of:

placing the masa through the opening in the masa hopper;

feeding the masa to at least one shaft;

removing gas bubbles from the masa with the projection on at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projection on at least one shaft.

53. The method for feeding masa as defined in Claim 52, wherein said feeding is accomplished by gravity.

54. The method for feeding masa as defined in Claim 52, wherein said rotating is accomplished by a motor.

55. The method for feeding masa as defined in claim 52, wherein the masa hopper also has a pair of opposed, horizontally aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

56. The method for feeding masa defined in Claim 55, wherein there is a scraper for each primary roller, each scraper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the step of:

separating masa from the lower surface of each of the primary rollers.

57. The method for feeding masa as defined in claim 55, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing the movement of the masa past the ends of the primary rollers.

The Examiner is invited to telephone the undersigned attorney if it appears that a telephone conference would further this case in any way.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: **Box Reissue, Assistant Commissioner for Patents, Washington, DC 20231** on

May 4, 2001

By Angela Williams

Signature
May 4, 2001

Respectfully submitted,

Joseph C. Andras
Registration No. 33,469
MYERS, DAWES & ANDRAS LLP
19900 MacArthur Blvd., Suite 1150
Irvine, CA 92612
(949) 223-9600

US005635235A

United States Patent [19]

Sanchez et al.

[11] Patent Number: 5,635,235

[45] Date of Patent: Jun. 3, 1997

[54] METHODS FOR HANDLING MASA

[75] Inventors: Victor R. Sanchez, Fontana; Alberto Ceja, Pico Rivera; Rigoberto Anguiano, Baldwin Park, all of Calif.

[73] Assignee: Machine Masters, Inc., Pomona, Calif.

[21] Appl. No.: 476,198

[22] Filed: Jun. 7, 1995

Related U.S. Application Data

[62] Division of Ser. No. 192,458, Feb. 7, 1994.

[51] Int. Cl.[6] A21C 9/00

[52] U.S. Cl. ..... 426/496; 426/502; 426/503; 426/512; 426/518; 99/443 C; 99/353; 198/604; 198/607; 198/626.1; 221/84

[58] Field of Search ..... 426/391, 496, 426/502, 503, 516-518, 512, 549; 99/443 C, 352, 353; 198/604, 607, 626.1; 221/71, 74, 84

[56] References Cited

U.S. PATENT DOCUMENTS

3,693,533	9/1972	Liepa	99/234
3,853,016	12/1974	Lane, III et al.	74/231
3,869,971	3/1975	Driscoll	99/353
4,304,326	12/1981	Fowler	198/623
4,334,845	6/1982	Tamminen	99/353 X
4,640,843	2/1987	Matuszak et al.	426/560
4,661,364	4/1987	Campbell	426/496
4,778,690	10/1988	Sadel, Jr. et al.	426/560
4,978,548	12/1990	Cope et al.	426/439
4,985,269	1/1991	Irvin et al.	426/560
5,050,727	9/1991	Akesaka	198/626.1
5,158,792	10/1992	Morikawa et al.	426/503 X
5,200,203	4/1993	Hayashi	198/604 X
5,272,962	12/1993	Kageyama et al.	99/353

Primary Examiner—Milton Cano

Attorney, Agent, or Firm—Keith A. Newburry, Esq.; Pretty, Schroeder, Brueggemann & Clark

[57] ABSTRACT

Masa handling methods for the continuous processing of masa type dough in conjunction with commonly available feed processing equipment, such as a masa extruder, an oven, or cooling apparatus. One masa handling method includes a masa separator having a pair of opposed, endless belt conveyors having facing surfaces spaced apart to receive a generally continuous masa stream output from a nozzle on the masa extruder. When the masa stream moves between the conveyors, it is gripped by their facing surfaces and moved away from the nozzle, causing the masa to be separated into individual pieces, or logs. The masa handling method can also include feeding the masa to masa hoppers fed by at least two endless belt conveyors arranged in upstream and downstream positions relative to each other. The masa is transported along the conveyors and is automatically diverted into one masa hopper by a diverter gate operated by a controller that receives a signal from a sensor sensing a masa level within an associated one of the hoppers. The hopper has one or more rotating shafts having projections to remove gas bubbles from the masa and force it toward the sheeter rollers. A pair of primary rollers with scrapers can be provided within the hopper to roll the masa to an intermediate thickness before it passes between the sheeter rollers.

20 Claims, 4 Drawing Sheets

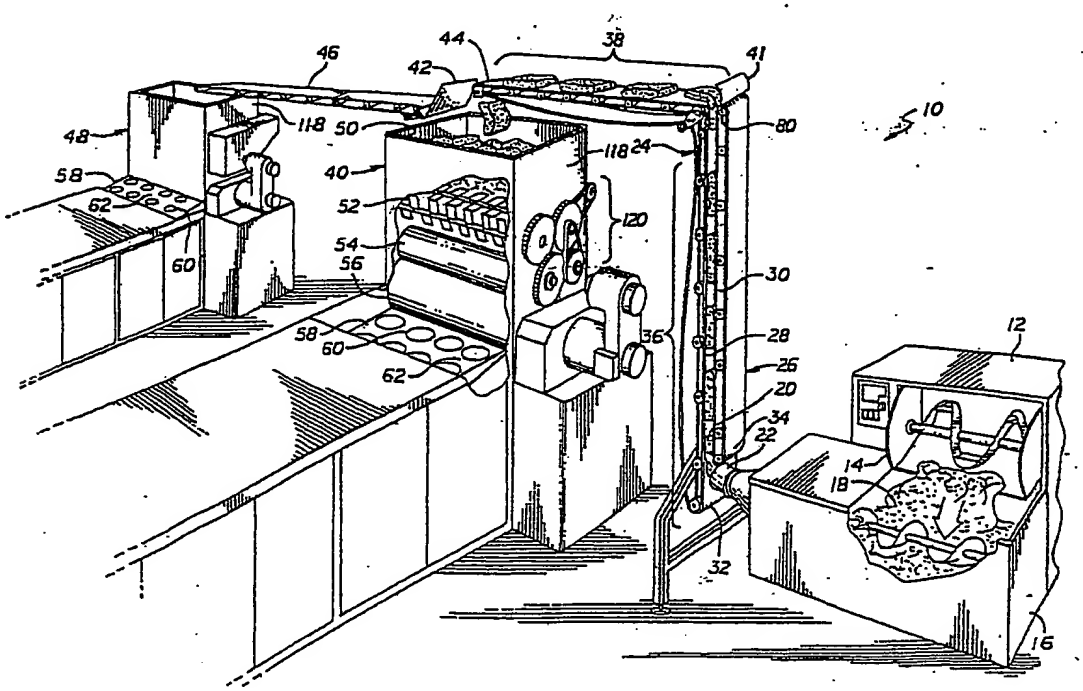


FIG. 1

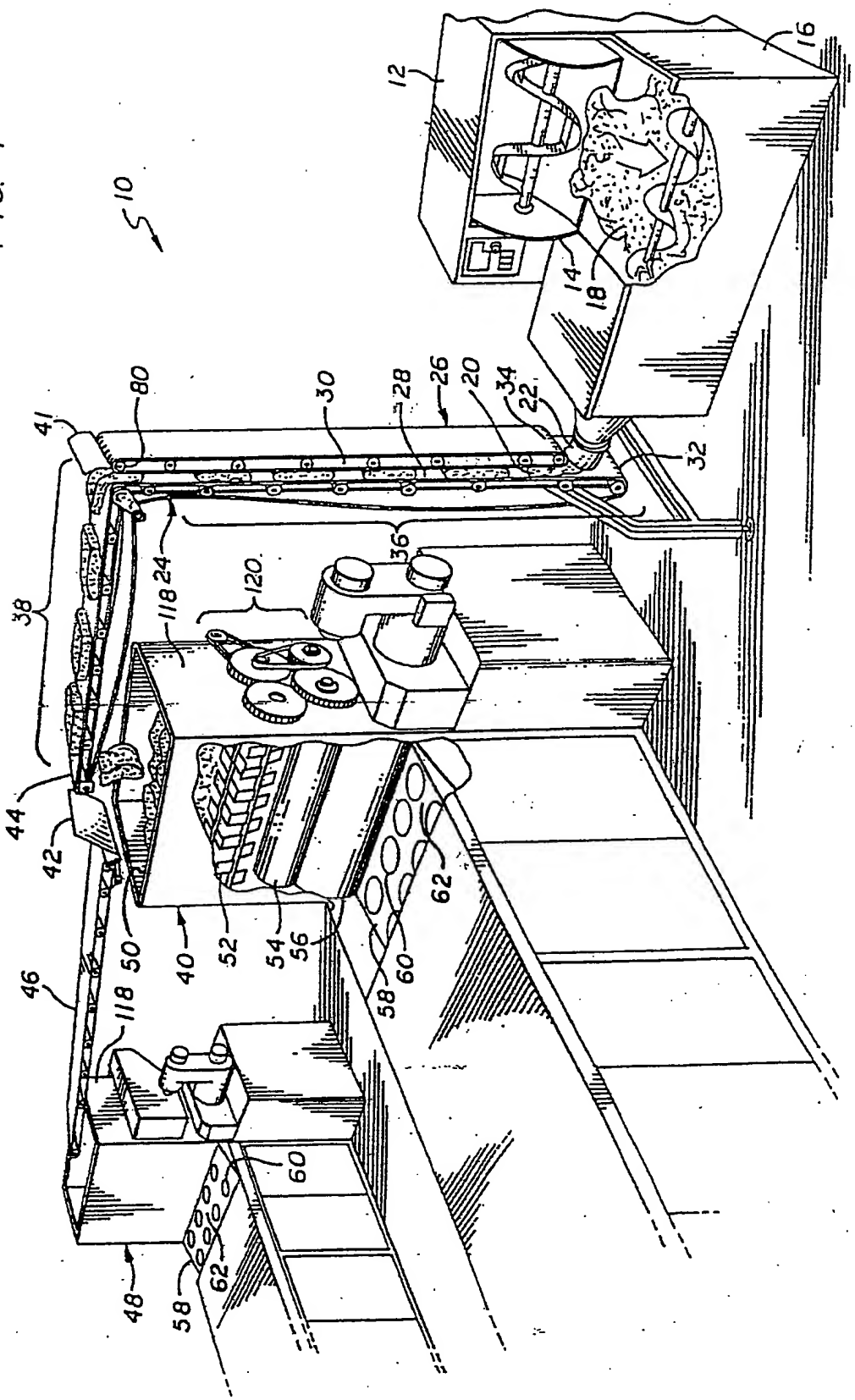

10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
41
42
44
46
48
50
52
54
56
58
60
62
80
118
120

FIG. 2

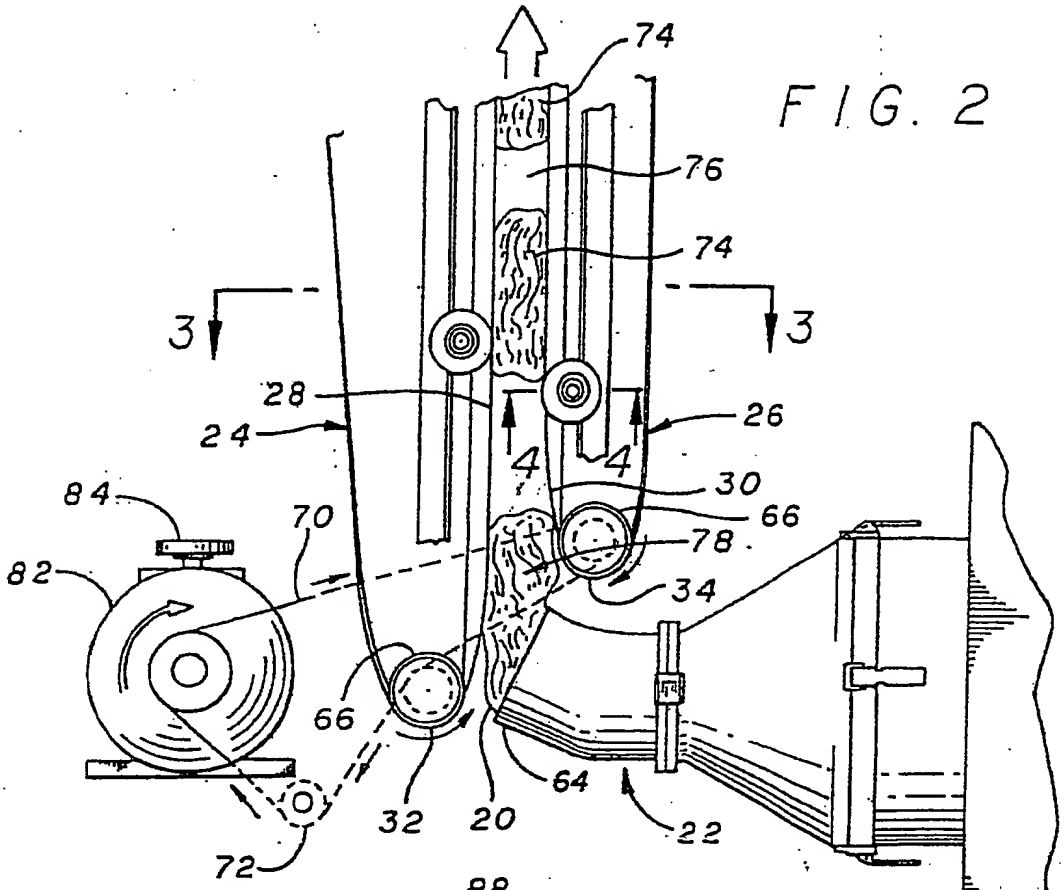


FIG. 3

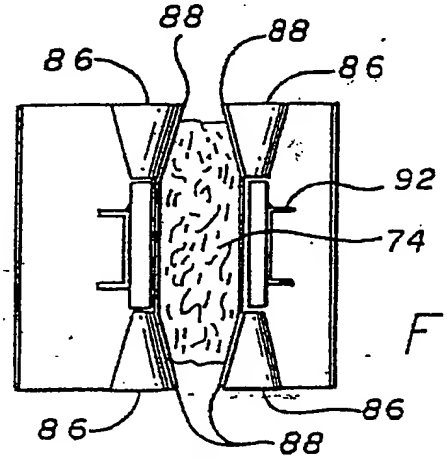
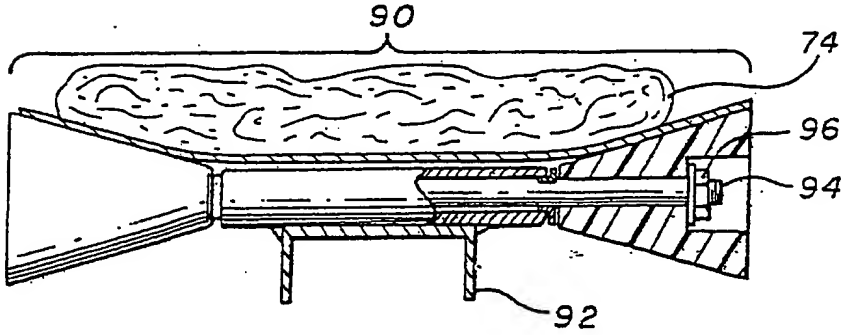


FIG. 4



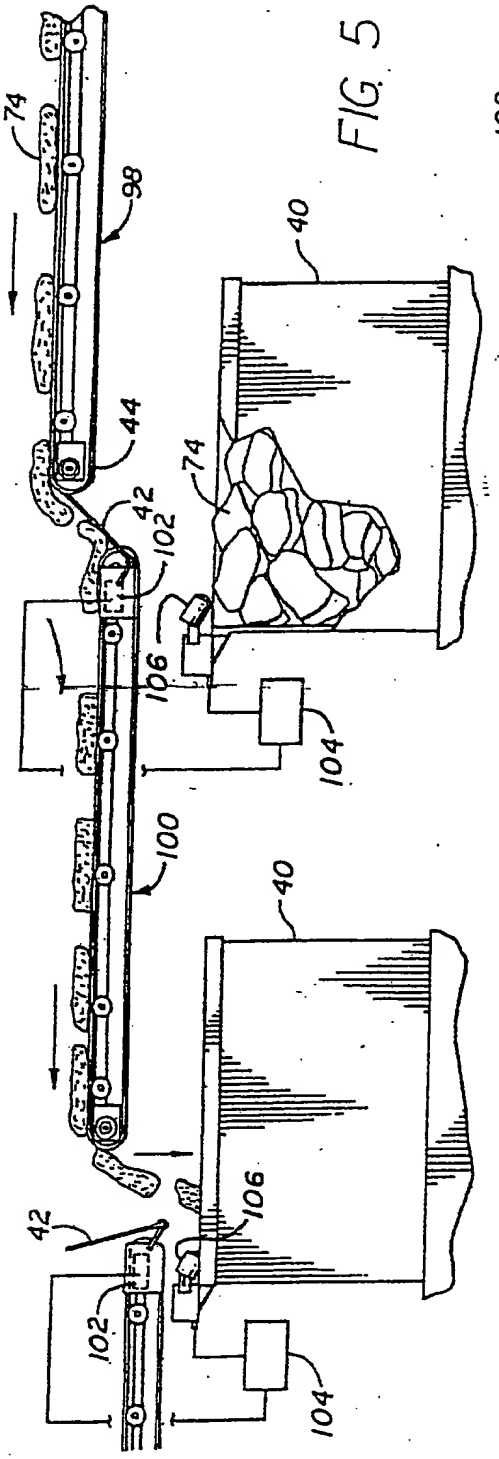


FIG. 5

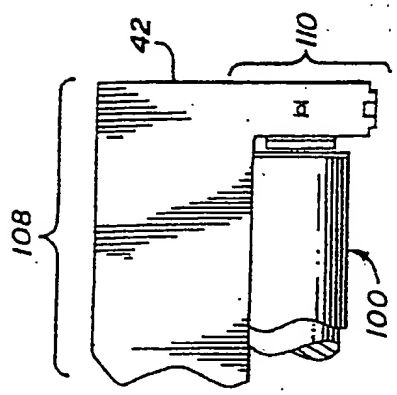


FIG. 6A

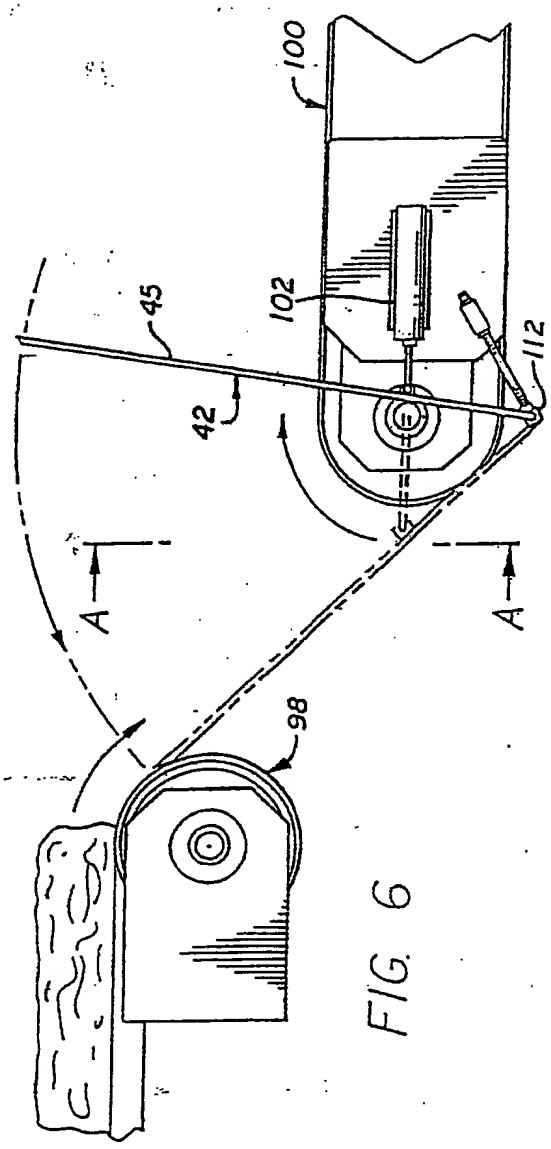


FIG. 6

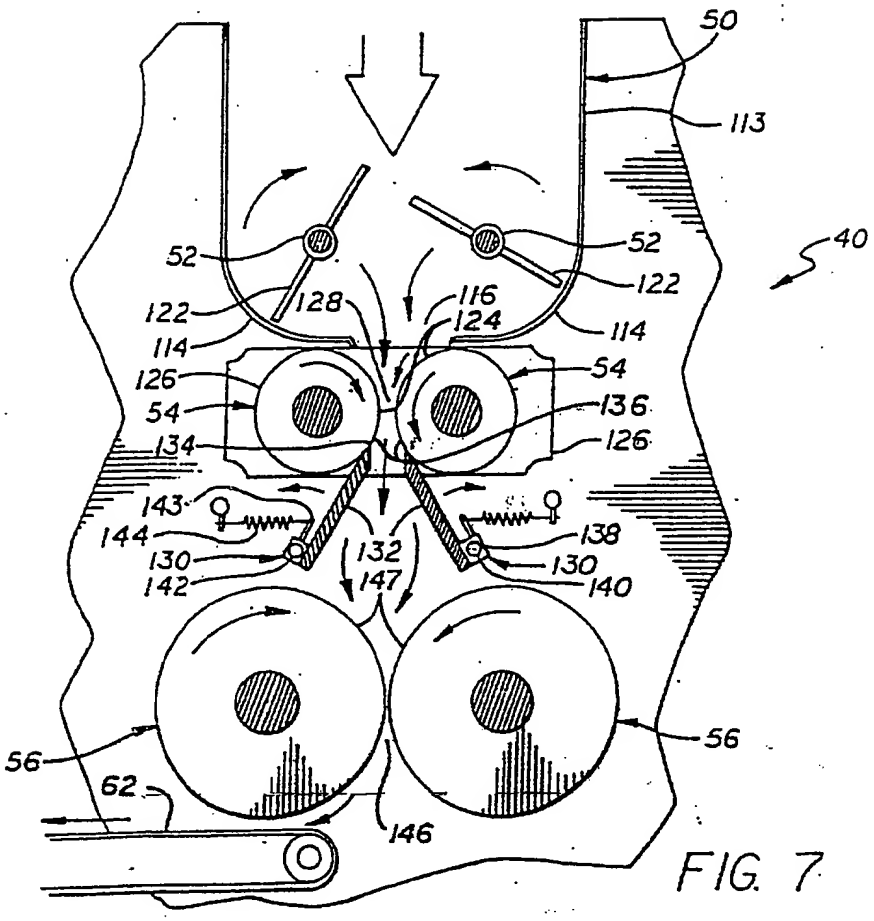


FIG. 7

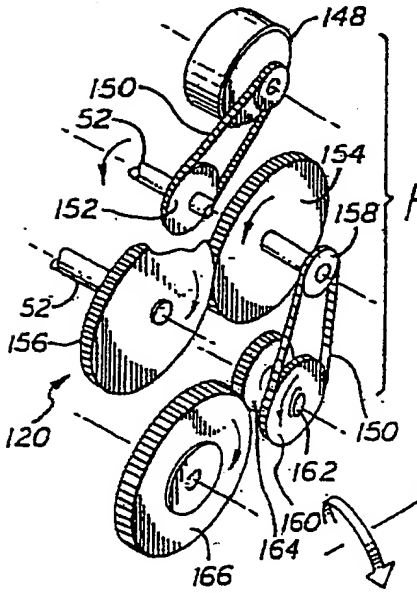


FIG. 8

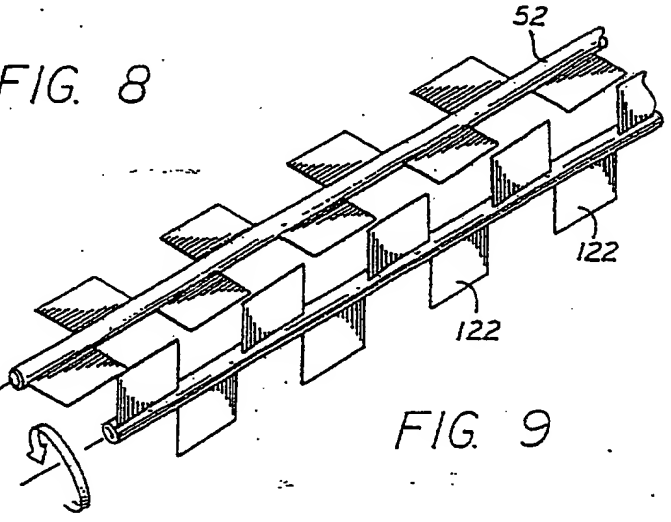


FIG. 9

METHODS FOR HANDLING MASA

This application is a division of application Ser. No. 08/192,458, filed Feb. 7, 1994.

FIELD OF THE INVENTION

The present invention relates to an apparatus and method for the commercial manufacture of food or edible material, and, more particularly, to the treatment or preparation of farinaceous dough, banter, or pastry products including sheeting, laminating, or folding.

BACKGROUND OF THE INVENTION

A tortilla is a baked grain product which originated in Mexico and is now widely consumed throughout the world. The word tortilla as used herein refers to such a baked grain product having a variety of shapes, including a circular shape, formed from a relatively flat dough. While the present invention concerns the production of tortillas, the invention also may also successfully used in the production of food products having other shapes.

As the demand for tortillas has grown, the methods and the apparatus for automatically producing tortillas in high volumes has become well known. In the conventional automated system, a dough is produced by cooking whole corn and grinding it wet or by combining instant corn masa flour with water in a commonly available mixer. This dough is generally referred to as "masa". However, the term "masa" as used herein refers to this corn dough and other doughs having similar characteristics. The masa is often fed into an extruder which compresses the masa and outputs it in the form of a generally continuous stream to a pneumatic cutter. The pneumatic cutter chops the masa into generally cylindrical pieces, generally known as "logs". The logs are usually carried on a conveyor to a masa hopper, which gravity feeds the masa to several successive pairs of generally opposed, cylindrical rollers for compression into a sheet having the thickness required for tortilla production. The final pair of opposed rollers are generally known as "sheeter" rollers because they produce a thin sheet of masa. This "sheeted" masa is then cut into the desired tortilla shape by a commonly available rotary cutter, which usually cuts circles of varying diameter. The cut masa is then baked, cooled, and packaged by commonly available commercial food processing equipment.

A portion of an automatic masa processing system is shown in the Driscoll U.S. Pat. No. 2,869,971. The masa processing system described by Driscoll has an endless belt conveyor for feeding masa to a masa hopper. The masa within the masa hopper is then gravity fed into a pair of opposed, counter-rotating primary rollers which compress the masa into a wide curtain of an intermediate thickness. The curtain then moves along a conveyor to a set of sheeter rollers for a final compression into the sheet having a thickness suitable to form the desired tortillas. The sheeted masa is then moved, via conveyor, through a rotating cutter which stamps circular shapes in the masa sheen. Although the rest of the Driscoll apparatus is designed to manufacture food chips from the cut masa, the remainder of the process of baking and cooling tortillas, which only generally concerns this invention, is well known and is schematically shown in the Cope et al. U.S. Pat. No. 4,978,548. Also by way of reference, another Matuszak et al. U.S. Pat. No. 4,640,843, describes a masa extruder and a masa hopper feeding two primary rollers and one associated sheeter roller.

The inventors of the present invention have no reason not to believe that the masa processing system previously described is not generally effective and safe. However, under certain conditions, there may be some drawbacks associated with masa processing systems generally designed according to the prior art. One such drawback can be the danger associated with the pneumatic cutter. The pneumatic cutter has a reciprocating blade which could injure an attending worker if that worker places his or her hands under the operating blade.

Another drawback can be associated with the conveyors intended to transport the masa logs from the pneumatic cutter to the masa hoppers. With increasing demand for tortillas, many companies now desire to operate several parallel production lines, each line having its own masa hopper and its own associated subsequent rolling, cutting, cooking, cooling, and packaging apparatus. Generally, because one masa mixer and extruder can output enough masa to adequately supply several production lines, it is desirable to have an automatic masa hopper feed system capable of maintaining an adequate supply of masa within each masa hopper. However, the conveyors designed according to the prior art simply move masa logs from the pneumatic cutter to one masa hopper. Thus, a masa handling system built according to the ptior art could require several conveyors, each running independently from the pneumatic cutter to an associated masa hopper. Furthermore, human attendants could be required to monitor the level of masa in each masa hopper and guide the masa logs onto the conveyors which are running to near-empty masa hoppers. Such a system could have evident disadvantages due to the labor cost of the attendants and the awkwardness of the manual channeling of masa to each conveyor. Furthermore, if the system utilizes only one conveyor running past the masa hoppers in series, the unwanted labor expense is also necessary because human attendants could be required to maintain the masa levels by manually carrying the masa logs from the conveyor to a near-empty masa hopper.

Yet another drawback can be associated with the masa hoppers generally designed according to the prior art. Unwanted gas bubbles can become trapped in the masa and cause voids in the wide masa curtain output by the primary rollers. When this occurs, the voids persist as the masa continues through the sheeter rollers and the rotary cutter, causing imperfectly formed tortillas to be produced. To eliminate the voids, human attendants must manually compress the masa while it is in the masa hopper, resulting in undesirable increased costs.

One final drawback associated with the primary rollers designed according to the prior art can be the tendency of the masa curtain to adhere to the primary rollers after its initial compression. If the masa curtain exits from the primary rollers in a fashion whereby it is stuck to the surface of one of the rollers, the curtain can be carried around the primary roller and away from the sheeter rollers. As a result, the now of masa to the sheeter rollers can be substantially disrupted.

It should, therefore, be appreciated that there still is a need for masa processing system that has the following features: the safe separation of the masa into individual logs; the automatic distribution of those logs to the masa hoppers requiring resupply; the automatic removal of gas bubbles from the masa within the masa hopper; and the prevention of the masa curtain from becoming stuck to the primary rollers. Accordingly, the present invention fulfills all of these needs.

SUMMARY OF THE INVENTION

The present invention provides a masa handling system that has the following features: the safe separation of the

masa into the individual logs; the automatic distribution of those logs to the masa hoppers requiring resupply; the automatic removal of gas bubbles from the masa within the masa hoppers; and the prevention of the masa curtain from becoming stuck to the primary rollers. The masa handling system of the invention is for use in conjunction with commonly available food processing equipment, such as an oven and cooling apparatus for the commercial processing of masa. By way of example, the present inventors refer to masa, but intend to include other similar doughs within the meaning of the word "masa."

Such masa processing equipment generally has a masa producing device, typically a mixer and an adjacent extruder which produces a generally continuous stream of masa to the invention. The masa is processed according to the invention and is ultimately fed into a pair of opposed, aligned, counter-rotating sheeter rollers which compress the masa into a final thickness.

More particularly, the masa handling system has a masa separator having a pair of aligned, opposed endless belt separator conveyors. The separator conveyors have their facing surfaces spaced apart and generally parallel to define a masa chamber therebetween. The masa chamber has input and output ends. The masa separator also has a nozzle connected to the masa producing device for feeding masa into the input end of the masa chamber. When the masa enters the masa chamber, it is gripped by the facing surfaces and moved therebetween. The facing surfaces of the separator conveyors move in the same direction away from the nozzle and cause the masa to be separated into masa logs.

The masa handling system includes at least two masa hoppers and at least two endless belt feed conveyors which have upper surfaces that move in the same direction. The feed conveyors are arranged in relative upstream and downstream positions relative to each other. The upstream feed conveyor extends from the output end of the masa chamber defined by the opposed, aligned separator conveyors of the masa separator, receive the masa logs. The upstream feed conveyor extends no a point generally above one of the masa hoppers. The downstream feed conveyor extends from a position spaced from the upstream conveyor to a point generally above another of the masa hoppers.

The masa handling system also has a diverter gate that is positioned between the feed conveyors. the diverter gate selectively moves between a first position and a second position. When the diverter gate is in the first position, the mesa logs are guided from the upstream feed conveyor to the downstream feed conveyor. When the diverter gate is in the second position, the masa logs are guided into the masa hopper.

The masa handling system also has a sensor associated with each masa hopper for the sensing of the level of masa therein. The sensor causes a signal which changes its state when the level of masa in the associated masa hopper is below a predetermined level. A mechanism is connected to each diverter gate and is responsive to the signal from the sensor. The mechanism moves the diverter gate from the first position to the second position when the level of masa is the one masa hopper is sensed to be below the predetermined level. The mechanism returns the diverter gate to the first position when the level of masa in the one masa hopper is sensed to be above a predetermined level.

The masa hoppers are self feeding and each has an opening positioned for receiving masa from its associated feed conveyor. Each masa hopper also has a gravity feeder with side walls and a bottom wall cooperating to define a space for the placement of the masa to be fed to the sheeter rollers. One or more rotating shafts are mounted within the gravity feeder. Each shaft has projections which remove gas bubbles from the masa and force the masa towards the sheeter rollers. The bottom wall of the gravity feeder extends from the side walls and defines a slot which the masa passes through, towards the sheeter rollers.

The foregoing structural arrangement of the invention provides several important advantages. Chief among them is the safe separation of the generally continuous masa stream into masa logs. As discussed above, the devices designed according to the prior art incorporate a pneumatic cutter that has a blade which can injure attending workers. Accordingly, it is desirable to separate the masa stream into masa logs without the pneumatic cutter and its associated danger. The present invention avoids this problem because it does not utilize a cutter with a blade. Therefore, the present invention offers a relatively safer apparatus which can separate the masa stream into masa logs.

Another advantage associated with the invention is the automatic distribution of the masa logs to the individual masa hoppers requiring resupply. As discussed above, it is desirable to eliminate the cost of the human labor associated with maintaining the proper level of masa within each masa hopper. The automatic monitoring by the sensors and the corresponding automatic operation of the diverter gates provides for the automatic distribution of masa logs to the masa hoppers. Accordingly, the supply of masa within each masa hopper is advantageously maintained without the costs associated with human labor.

Yet another advantage with the invention is the automatic removal of gas bubbles from the masa within the masa hoppers. As discussed above, it is desirable to eliminate the human labor associated with the removal of the gas bubbles from the masa within the masa hoppers. The projections on the rotating shafts advantageously compress the masa and remove the gas bubbles without any corresponding human labor. Accordingly, the gas bubbles are advantageously removed without the costs associated with such human labor.

In one aspect of the invention, the facing surfaces of the separator conveyors are curved toward each other so that a cradle is formed for securely holding the masa between the separator conveyors. As compared to an arrangement having flat facing surfaces, the masa is less likely to move out from its position between the separator conveyors.

In another aspect of the invention, each masa hopper has a scraper for each of its primary rollers. Each scraper has a blade which is pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller. The blade separates the masa which has adhered to the surface of the primary roller. An advantage associated with this aspect of the invention is the prevention of the masa curtain from becoming stuck to the lower surface of the primary rollers. As discussed above, it is desirable to maintain the movement of the masa curtain toward the sheeter rollers. When the masa curtain adheres to one of the primary rollers, the masa curtain may not continue toward the sheeter rollers. Accordingly, this aspect of the invention advantageously ensures that the masa curtain travels toward the sheeter rollers instead of becoming diverted by adherence to one of the primary rollers.

It will be appreciated that, while the masa handling system of the present invention is especially adapted for use with a corn based masa dough, the invention will also handle any dough that has similar properties. Accordingly, the

invention could also be used in conjunction with any other dough which could be handled according to the masa dough handled by the present invention.

Other features and advantages of the present invention will become apparent from the following description of the preferred embodiment, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The following drawings illustrate the preferred embodiment of the invention. In the drawings:

FIG. 1 is a perspective view of a masa handling system, partly in cut away section.

FIG. 2 is a side view showing the separator conveyors accepting masa from the nozzle.

FIG. 3 is a cross-sectional elevational view of the separator conveyors shown in FIG. 2.

FIG. 4 is a cross-sectional elevational view, partially in cut-away section, of the idler rollers shown in FIG. 3.

FIG. 5 is a side view of several feed conveyors positioned over two masa hoppers, shown in partial cut-away section.

FIG. 6 is a side view of a diverter gate shown in FIG. 5.

FIG. 6A is an end view of the diverter gate shown in FIG. 6, shown in partial cut-away section.

FIG. 7 is a side view, in partial cut-away section, of a masa hopper shown in FIG. 1.

FIG. 8 is a perspective view of the A/C motor and drive gears for the primary rollers and rotating shafts shown in FIG. 7.

FIG. 9 is a detail perspective view of the rotating shafts shown in FIG. 7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the exemplary drawings, the present invention is embodied in a masa handling system, generally referred to by the reference numeral **10**, for use within a food processing system which produces a food product made from masa. Masa is a dough produced by cooking whole corn and grinding it wet or by combining instant corn masa hour with water in a commonly available mixer. This dough is generally referred to as "masa". However, the term "masa" as used herein refers to this corn dough and other doughs having similar characteristics.

The preferred masa handling system **10** (FIG. 1) is a part of a larger arrangement of apparatus intended for the commercial production of tortillas or other food having a masa dough as an ingredient. The general arrangement of the preferred masa handling system **10** will now be described. A commonly available commercial mixer **12** is located at the beginning of the production line. The mixer **12** has a pivoting door **14** which can rotate downward towards a masa extruder **16**. The masa extruder **16** can be of any type, as long as it compresses the masa **18** and feeds a generally continuous masa stream **20** through a nozzle **22**. Two vertically opposed and aligned endless belt separator conveyors **24** and **26** have moving surfaces **28** and **30** which face each other. The longitudinal ends **32** and **34** of separator conveyors **24** and **26** are mounted adjacent to the nozzle **22**. One of the two separator conveyors **24** is "L" shaded and has a vertical section, or vertical portion, **36** and a horizontal section, or horizontal portion, **38** which terminates above a masa hopper **40**. The vertical section **34** of the "L" shaped separator conveyor **24** extends longitudinally below the longitudinal end of the other separator conveyor, thereby providing a moving surface opposite from the nozzle **22**. A deflector plate **41** is mounted on the end of the other separator conveyor **26**. The previously discussed separator conveyors **24** and **26** move the masa **18** to the first masa hopper **40**. That masa **18** hopper **40** must be supplied with masa **18** periodically.

A selectively operable diverter gate, for periodically allowing resupply of the masa hopper **40**, is located ~~adjacent to the end **44** of~~ the horizontal section **38** of the "L" shaped separator conveyor **24**. The diverter gate **42** is shown in its open position. However, when the diverter gate **42** is closed, its top surface **45** forms a gravity slide that feeds to a horizontal feed conveyor **46**, which, in turn, feeds another masa hopper **48**. It will be understood that while two masa hoppers **40** and **48** are shown, the masa handling system **10** can be adapted for use with any number of masa hoppers. Therefore, the invention is not limited by the number of masa hoppers.

Each masa hopper **40** and **48** has a hollow inner gravity feeder portion **50** containing two counter rotating shafts **52** mounted above a pair of primary rollers **54**. The primary rollers **54** are, in turn, mounted above a pair of sheeter rollers **56** and a common rotary cutter (not shown). A horizontal tortilla conveyor **58** is mounted below the rotary cutter and has tortillas **60** on its upper surface **62**. The remainder of the system can include various combinations of commonly known and widely available commercial food processing apparatus (not shown), such as an oven, a cooling rack, and a packaging system.

The masa handling system **10** has a structure intended to separate masa logs **74** from a continuous stream of masa **20** (~~FIGS. 2, 3, and 4~~). ~~The masa extruder **16** is connected~~ to a nozzle **22**. The nozzle **22** has a generally circular cross section and is angled so than its end **64** is slightly elevated. A generally continuous masa stream **20** is shown exiting from the nozzle **22**. The ends of two aligned, opposed, vertical endless belt separator conveyors **24** and **26** are spaced apart and each pass around an associated one of two drive rollers **66** adjacent to the nozzle **22**. The drive rollers **66** are connected to a variable speed A/C motor **82** via a belt **70**, which also passes around a tensioner wheel **72**. The "L" shaped separator conveyor **24** extends longitudinally below the end of the other separator conveyor **26** and has a moving surface **28** facing the nozzle **22**. The other separator conveyor **26** also has a moving surface **30**. The separator conveyors **24** and **26** are spaced to hold masa pieces, or logs **74**, between them. The distance separating the two separator conveyors **24** and **26** will vary with the size of the generally continuous masa stream **20** extruded from the nozzle **22**. The space between the moving surfaces **28** and **30** of the separator conveyors **24** and **26** defines a masa chamber **76**. The masa chamber **76** extends the vertical length of the separator conveyors **24** and **26** and has an input end **78** adjacent to the nozzle **22** and an output end **80** where the masa logs **74** are deposited onto the horizontal section **38** of the "L" shaped conveyor **24**. The separate conveyors **24** and **26** must be driven in order to separate the masa logs **74** and move them away from the nozzle **22**.

The variable speed A/C motor **82** is provided to drive the separator conveyors **24** and **26**. The A/C motor **82** has an upper knob **84** to enable the user to adjust its speed. The required power of the motor **82** varies with the length of the separator conveyors **24** and **26** to be driven, however, an A/C motor **82** between ½ and 3 horsepower is generally adequate for most applications. The method by which the speed of the

motor 82 is adjusted is commonly known and can be either by a mechanical means, such as a gearbox (not shown), or an electronic means, such as by an A/C frequency inverter (not shown). While the masa 74 moves upward, the masa 74 must be prevented from falling out from between the separator conveyors 24 and 26.

The moving surfaces 28 and 30 of the separator conveyors 24 and 26 are supported by trapezoidal idler rollers 86 which keep the masa logs 74 between the separator conveyors 24 and 26. The trapezoidal idler rollers 86 cause the moving surfaces 28 and 30 of the separator conveyors 24 and 26 to curve toward each other on their edges 88. Because the edges 88 of the moving surfaces 28 and 30 are curved toward each other, a cradle 90 is formed for securely holding the masa logs 74 between the separator conveyors 24 and 26. Each idler roller 86 is fastened to the frame 92 of the conveyors 24 and 26 by well known means, such as by a threaded axle 94 and a nut 96. After the masa logs 74 have been separated from the masa stream 20, they must be guided into a masa hopper 40 which requires resupply.

The selectively operable diverter gate 42 (FIG. 5) is mounted between an upstream 98 and a downstream 100 endless belt feed conveyor and guides the masa logs 74 to the appropriate masa hopper. The feed conveyors 98 and 100 are positioned end to end, and are vertically spaced so that the masa logs 74 can move from one feed conveyor 98 and 100 to the next, in series. The diverter gaze 42 is pivotally mounted on the downstream feed conveyor 100 and, in the closed position, extends to the end of the upstream feed conveyor 98 thereby forming a gravity slide between the two feed conveyors 98 and 100. In the open position, the diverter gate 42 is withdrawn from the upstream feed conveyor 98. While two diverter gates 42 are shown, any number can be used, depending on the number of masa hoppers 40 desired. Generally, every masa hopper 40, except the last in the series, has an associated diverter gate 42 mounted above it. The last masa hopper 40 does not have a diverter gate 42 because a feed conveyor 46 terminates above it. It will be understood, however, that the last masa hopper 40 could have an associated diverter gate 42 should the diversion of masa 74 from that masa hopper 40, for recycling or other purposes, be desired. The diverter gate 42 must be driven by a device in order to move between the open and closed positions.

The selectively operable diverter gate 42 (FIGS. 6 and 6A) is driven by a pneumatic cylinder 102 which is controlled by a common programmable language controller 104 (PLC). The PLC 104 is shown as separate boxes in FIG. 5 for clarity purposes. Preferably, only one PLC 104 is needed to drive multiple diverter gates 42, however, each diverter gate 42 could have its own associated PLC 104. The PLC 104 is also connected to a photo sensor 106 positioned to sense the level of masa 74 within the masa hopper 40 and provide the corresponding signal to the PLC 104. The diverter gate 42 is connected to a pneumatic cylinder 102 mounted on the downstream feed conveyor 100. The diverter gate 42 has a generally rectangular section 108 extending across the width of the feed conveyors 98 and 100 and a smaller rectangular arm 110 protruding below the rectangular section 108. The smaller rectangular arm 110 facilitates the attachment of the diverter gate 42 to the pivot point 112 and the pneumatic cylinder 102 mounted on the side of the downstream feed conveyor 100. When the pneumatic cylinder 102 withdraws the diverter gate 42 away from the upstream feed conveyor 98, the masa logs 74 drop off of the upstream feed conveyor 98, accordingly, a structure must be provided to catch the masa logs 74.

A self feeding masa hopper 40 (FIG. 7, 8, and 9) is located beneath the end of the upstream feed conveyor 98 and catches the masa logs 74 after they have been diverted. The self feeding masa hopper 40 has a gravity feeder including side walls 113 and a curving bottom wall 114 which defines a slot 116. A pair of horizontal counter-rotating shafts 52 are mounted within the gravity feeder 50. The shafts 52 are generally parallel to each other and longitudinally straddle the slot 116, which is below the shafts 52 in the bottom wall of the gravity feeder 50. One end of each of the shafts 52 extends through the wall 118 of the masa hopper 40 to interface with drive gears 120 to be described later. The shafts 52 have rectangular projections 122 which are positioned in an alternating fashion so as to enable the projections 122 to intermesh and pass through the same space above the slot 116 as they are rotated. When the projections 122 pass above the slot 116, they drive the masa 74 through the slot 116 so it can be rolled. Accordingly, a structure must be provided to roll the masa 74.

The self feeding masa hopper 40 has a pair of horizontal primary rollers 54 to accept the masa 74 which passes through the slot 116. The primary rollers 54 have a cylindrical surface 124 and are mounted in a generally parallel, horizontally aligned relationship between two endcaps 126. The endcaps 126 prevent the masa 74 from moving horizontally, along the surface 124 of the primary rollers 54, past the ends of the primary rollers 54. The primary rollers 54 are positioned so that a gap 128 is defined between their converging surfaces 124. The gap 128 is below and aligns with the slot 116 to facilitate the travel of the masa 74 from the slot 116 through the primary rollers 54. The width of the gap 128 varies according to the food product to be produced, but is generally ¼ inch for typical tortilla production. It is to be understood that the width of the gap 128 between the primary rollers 54 of the masa hopper 40 can be varied according to the food product. Accordingly, the invention is not to be limited by the gap 128 between the primary rollers 54 of the masa hopper 40. After the masa 74 has passed through the gap 128, the masa 74 often adheres to the surfaces 124 of the primary rollers 54.

Two scrapers 130 are provided to prevent the masa 74 from adhering to the primary rollers 54. Each scraper 130 has a generally rectangular blade 132 which has a sharp point 134 that rides along the lower surface 136 of a primary roller 54 and separates any adhering masa 74. The blade 132 is made from ultra high molecular weight (UHM) copolymer plastic or any common equivalent, such as polytetrafluoroethylene. A stainless steel pivoting beam 138 is attached along the base of the blade 132 by screws (not shown) countersunk into the blade 132 material. The pivoting beam 138 has a generally square cross section, but has cylindrical ends 140. A threaded, centered hole 142 is provided on each end of the beam 138 for attachment to the masa hopper 40. Two arms 143 are perpendicularly attached to each beam 138 and extend behind the blade 132. The arms 143 are joined to the beam 138 by welding or any other common joining process. A spring 144 is connected between the end of each arm 143 and the wall 118 of the masa hopper 40, thereby providing a biasing force to keep the blade 132 riding on the lower surface 136 of the primary roller 54. Once the masa 74 has passed by the scrapers 130, it has a thickness to great for forming tortillas 60. Accordingly, the masa 74 must be compressed yet again.

Two sheeter rollers 56 are provided for compressing the masa 74 to the final thickness which is suitable for the final cutting of the tortillas 60. The sheeter rollers 56 are generally cylindrical are mounted in a generally parallel, horizontally

aligned relationship. The sheeter rollers 56 are positioned so that a gap 146 is defined between their converging surfaces 147. The gap 146 between the sheeter rollers 56 is below and aligns with the gap 128 between the primary rollers 54 to facilitate the travel of the masa 74 from the primary rollers 54 to the sheeter rollers 56. A rotary cutter (not shown) is mounted below the sheeter rollers 56 so that tortillas 60 are expelled onto the horizontal tortilla conveyor 58. The rotary cutter (not shown) is commonly available and can be adapted to cut any shape from the sheeted masa (not shown). The previously described structure, including the rotary shafts 52 and the primary rollers 54, must be driven in order to properly process the masa.

A masa hopper motor 148 (FIG. 8) drives the rotary shafts 52 and the primary rollers 54 through the drive gears 120 on the outside of the masa hopper. The masa hopper motor 148 operates on A/C current and is capable of variable speeds due to an electronic control, such as an A/C frequency inverter (not shown). A mechanical gear arrangement (not shown) may also be used to yield variable speeds. The power of the masa hopper motor 148 varies according to specific applications, but generally a 2 to 5 horse-power motor is adequate. A belt 150 connects the masa hopper motor 148 and a first gear 152 mounted on the first shaft 52. That same shaft 52 extends into the masa hopper and has the projections which compress the masa. A larger second gear 154 mounted on the same rotary shaft 52 intermeshes with a generally equally sized third gear 156 which is mounted to the other shaft 52. Another fourth gear 158 is connected to the first shaft has a belt connected to a lower, fifth gear 160. The fifth gear 160 is mounted on a primary roller axle 162, which has, in turn another, sixth gear 164, which intermeshes with yet another seventh gear 166 mounted on the other primary roller axle 168. While the sites of the sixth 164 and seventh gears 166 can be varied, a ratio of 10.333 to 4.25 is generally preferred. After having understood the interrelating structure of the masa handling system 10, the movement of the masa 74 through the system should now be described.

Generally, the preferred masa handling system 10 is intended to move masa 18 from a commonly available masa extruder 16 to the horizontal tortilla conveyor 58 leading to further food processing equipment, such as a commercial oven or fryer. Generally, masa dough 18 is used for the production of tortillas 60 having varying shapes. However, such dough can be used to produce a variety of other food products.

The process begins (FIG. 1) with the initial creation of the masa 18 in the mixer. When the masa 18 is suitably mixed, the pivoting door 14 opens and allows the attending workers to transfer the masa 18 into the extruder 16. The extruder 16 drives the masa 18 through the nozzle 22 so that a generally continuous masa stream 20 is projected up against the vertical surface 28 of the "L" shaded separator conveyor 24, which is moving upwards. The friction between the masa stream 20 and the vertical surface 28 of the "L" shaped conveyor 24 guides the masa stream 20 between the separator conveyors 24 andd 26. The masa stream 20 is pulled until it fractures into masa pieces, or masa logs 74. As used herein, the term "masa logs" 74 generally refers to pieces of masa separated from the generally continuous masa stream 20, including those with a generally oval cross section. The masa logs 74 travel upward and are guided onto the horizontal portion 38 of the "L" shaped separator conveyor 24 by the detector plate 41. The masa logs 74 then travel to the selectively operable diverter gate 42, which can either be automatically opened to allow the masa logs 74 to drop into the masa hopper 40, or automatically closed to guide the masa logs 74 to the next feed conveyor 100, which feeds the other masa hoppers 40. The precise operation of the selectively operable diverter gate 42 will be described below. Once in the masa hopper 40, the masa 74 is compressed by the projections on the rotating shafts 52, thereby removing the gas bubbles (not shown) within the masa 74 and forcing the masa 74 into the primary rollers 54. The primary rollers 54 compress the masa 74 into a generally uniform curtain (not shown) which is fed into the sheeter rollers 56. The sheeter rollers 56 compress the masa curtain to a thickness suitable for the cutting of tortillas 60, which is accomplished by the rotary cutter (not shown). The tortillas 60 then are carried by the tortilla conveyor 58 toward the remainder of the processing system (not shown), which can contain combinations of commonly known and widely available commercial food processing apparatus (not shown), such as an oven, a cooling rack, and a packaging system. The following description will provide more detail on the operation of the elements of the masa handling system 10.

The separation of the generally continuous masa stream 20 into masa logs 74 will now be described (FIGS. 2, 3, and 4). The generally continuous masa stream 20 is forced through the nozzle 22 by the extruder. The masa stream 20 has the cross section of the nozzle 22, which is generally circular. However, it will be understood that nozzles having other cross-sectional shapes could also be used. The generally continuous masa stream 20 moves into contact with the vertical surface 28 of the "L" shaped separator conveyor 24, which is moving upwards. The friction between the vertically moving surface 28 of the "L" shaped separator conveyor 24 and the masa stream 20 causes the masa stream 20 to move upwards into contact with the moving surface 30 of the other separator conveyor 26. The masa stream 20 must next be separated into the individual masa logs 74 required for further processing.

Together, the moving surfaces 28 and 30 of the separator conveyors 24 and 26 act to separate the masa stream 20 into individual masa logs 74. The moving surfaces 28 and 30 of the separator conveyors 24 and 26 are moved by the drive rollers 66 which are, in turn, driven by the variable speed A/C motor 82. The tensioner wheel 72 is biased to provide the proper tension on the belt 70 linking the A/C motor 82 to the drive rollers 66. The speed of the A/C motor 82 is adjusted such chat moving surfaces 28 and 30 of the separator conveyors 24 and 26 have an upward speed greater than that at which the masa stream 20 travels from the nozzle 22. The moving surfaces 28 and 30 grip the masa stream 20, so the masa stream 20 is carried upward at the same speed. Accordingly, the masa stream 20 is pulled from the nozzle 22 by the moving surfaces 28 and 30 of the separator conveyors 24 and 26 and is fractured into separate masa pieces, or masa logs 74. In this particular embodiment, the masa logs 74 are compressed between the separator conveyors 24 and 26 such chat they have an elongated oval cross section. The general length of the masa logs 74 can be adjusted by changing the speed of the A/C motor 82. As the difference between the speed of the separator conveyors 24 and 26 and the speed at which the masa stream 20 is expelled from the nozzle 22 is increased, the length of the masa logs 74 becomes smaller.

An important advantage is provided by the previously described arrangement and operation of the nozzle 22 and the separator conveyors 24 and 26. Unlike the prior art pneumatic cutter, the masa handling system 10 has no sharp blade which could injure an attending worker. Accordingly, the masa handling system 10 advantageously avoids the

dangers associated with a sharp blade, and provides a relatively safer apparatus and method for the separation of a generally continuous masa stream 20 into masa logs 74.

Another advantage associated is associated with the trapezoidal idler rollers 86 which are mounted behind the moving surfaces 28 and 30 of the separator conveyors 24 and 26. The converging edges 88 of the moving surfaces 28 and 30 form a cradle 90 which keeps the masa logs 74 between the separator conveyors 24 and 26. As compared to an arrangement having flat moving surfaces, the masa logs 74 are less likely to fall out from between the separator conveyors 24 and 26. After the masa stream 20 is separated into masa logs 74, the masa logs 74 must be diverted to the horizontal 38, or feed, portion of the "L" shaped separator conveyor 24.

The detector plate 41 guides the masa logs 74 onto the horizontal portion 38 of the "L" shaped separator conveyor 24. The masa logs 74 then move towards the selectively operable diverter gates 42. The photo-sensor 106 mounted adjacent to each masa hopper 40 senses the level of masa 74 therein. If the level of the masa 74 within any one masa hopper 40 drops below a predetermined level, the sensor 106 associated with that masa hopper 40 changes the state of its signal which is sent to the PLC 104. The PLC 104 then commands the pneumatic cylinder 102 to retract the diverter gate 42 located above that masa hopper 40. That diverter gate 42 pivots into an open position and the masa logs 74 then fall into that masa hopper 40. The photo-sensor 106 then signals the PLC 104 when the level of masa 74 within that masa hopper 40 rises above a certain predetermined level. The PLC 104 then commands the pneumatic cylinder 102 to extend, thereby closing that diverter gate 42 and allowing the masa logs 74 to travel on to the next masa hopper 40.

An advantage associated with the diverter gates 42 is the corresponding labor savings due to their automatic operation. Normally, human attendants would be necessary to ensure that the masa hoppers 40 each had a proper supply of masa 74. By utilizing the photo-sensors 106, the PLC 104, and the pneumatic cylinders 102, the diverter gates 42 operate automatically and the supply of masa logs 74 within each masa hopper 40 is maintained without costly human labor. It should be understood that, while a PLC 104 is preferably used to control the diverter gates 42, a corresponding logic system having electronic relays could also be used to perform the same control functions as the PLC 104. Once the masa logs 74 have been fed to the appropriate masa hopper 40, they must be compressed to remove gas bubbles which cause voids in the rolled masa (not shown).

The self feeding masa hopper 40 compresses and removes the unwanted gas bubbles from the masa 74. The masa is fed, via gravity, to the rotating shafts 52. The projections 122 on the rotating shafts 52 compress the masa 74 and force it through the slot 116 towards the primary rollers 54. The projections 122 on the rotating shafts 52 advantageously remove gas bubbles by compressing the masa 74 without requiring any human labor. Accordingly, the costs associated with the human attendants required by the prior art masa hoppers are avoided. Once the gas bubbles are removed from the masa 74, the masa must be rolled into a generally uniform curtain (not shown).

The primary rollers 54 compress the masa 74 into the generally uniform curtain suitable for feeding to the sheeter rollers 56. Both primary rollers 54 are driven by the masa hopper A/C motor 148 and have different sized drive gears 120 so the primary rollers 54 rotate at different speeds. This arrangement is especially advantageous because, as compared to rollers driven at the same speed, the masa 74 is less likely to stick to the lower surface of the primary rollers 54 when they rotate at different speeds. If the masa 74 sticks to the lower surface 136 of one of the primary rollers 54, it is carried around and will not be fed into the sheeter rollers 56. Accordingly, it is desirable to prevent the masa 74 from becoming stuck to the lower surface of the primary rollers 54. However, if, despite the differential speed, the masa 74 becomes stuck to one of the lower surfaces 136 of the primary rollers 54, it must be removed.

The scrapers 130 will advantageously separate the masa curtain if it becomes stuck to the lower surface 136 of one of the primary rollers 54. The springs 144 bias the blades 132 so that they ride on the lower surfaces 136 of the primary rollers 54. Accordingly, when the masa curtain becomes stuck to the lower surface 136 of one of the primary rollers 54, the blade 232 scrapes it off and it continues to travel towards the sheeter rollers 56.

The sheeter rollers 56 counter rotate at the same speed and compress the masa into its final thickness. The rotary cutter (not shown) cuts circular tortillas 60 from the masa on the underside of one of the sheeter rollers 56. The tortillas 60 then fall onto the tortilla conveyor 58 and are moved towards other food processing equipment, such as an oven.

It should be appreciated from the foregoing description that the present invention provides a masa handling system 10 having the following features: the safe separation of the masa stream 20 into individual logs 74; the automatic distribution of those logs 74 to the masa hoppers 40 requiring resupply; the automatic removal of gas bubbles from the masa within the masa hoppers; and the prevention of the masa curtain from becoming stuck to the primary rollers 54.

While a particular form of the invention has been illustrated and described, it will be apparent that various modifications can be made without departing from the spirit and scope of the invention. Accordingly, it is not intended than the invention be limited, except as by the appended claims.

We claim:

1. A method for handling masa within a food processing system having a pair of aligned, opposed separator conveyors having facing surfaces, the longitudinal ends of the separator conveyors positioned adjacent to a nozzle connected to a masa producing device, the food processing system further having at least two masa hoppers, the masa hoppers and the separator conveyors connected by at least two endless belt feed conveyors having upper surfaces moving in the same direction, the feed conveyors positioned in an upstream and downstream relationship relative to each other, at least one feed conveyor positioned adjacent to the other longitudinal ends of the separator conveyors, each masa hopper having an associated sensor for sensing, the level of mass and an opening positioned below a diverter gate located between the feed conveyors, each diverter gate connected to an associated mechanism and pivotable between an open position, where the masa is guided from the upstream feed conveyor to the downstream conveyor, and a closed position, where the masa is guided into the masa hopper, each masa hopper located adjacent to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having side walls and a bottom wall defining a slot, the masa hopper also having at least one shaft above the bottom wall, each shaft having projections, the method comprising the steps of:

moving the facing surfaces of the separator conveyors at equal speed away from the nozzle;

feeding a generally continuous masa stream through the nozzle such that the masa stream contacts at least one of the facing surfaces of the separator conveyors and is guided between the facing surfaces of the separator conveyors;

gripping the masa stream between both facing surfaces of the separator conveyors pulling the masa stream such that the masa stream is separated into masa logs;

feeding the mass logs onto the upstream end of a feed conveyor; moving the masa logs from the separator conveyors along the upper surfaces of the feed conveyors;

sensing the level of masa within an associated masa hopper;

causing a signal to change its state when the level of masa within the masa hopper is below a predetermined level;

selectively opening and closing the diverter gate to control the flow of masa logs to the masa hopper in response to said change in signal;

placing the masa logs through the opening of one of the masa hoppers;

feeding the masa logs to at least one shaft within the masa hopper; rotating the shaft;

removing gas bubbles from the masa with the projections on at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projections on at least one shaft.

2. The method as defined by claim 1, wherein the method further comprises the steps of;

arranging the facing surfaces of the separator conveyors to curve toward each other such that a cradle is formed to securely grip the masa.

3. The method as defined by claim 1, wherein the method further comprises the step of;

adjusting the speed of the facing surfaces of the separator conveyors to change the length of the masa logs.

4. The method as defined in claim 1, wherein the mechanism is a pneumatic cylinder connected to a controller, the method further comprising;

programming the controller to compare said signal to a predetermined value,

selectively commanding the operation of the pneumatic cylinder to control said selective opening and closing of the diverter gate.

5. The method as defined in claim 1, wherein said feeding is accomplished by gravity.

6. The method as defined in claim 1, wherein said rotating is accomplished by an A/C motor.

7. The method as defined in claim 1, wherein the masa hopper also has a pair of opposed, horizontally, aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of;

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

8. The method as defined in claim 7, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of;

preventing the generally horizontal movement of the masa past the ends of the primary rollers.

9. The method as defined in claim 7, wherein there is a scrapper for each primary roller, each scrapper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the step of:

separating masa from the lower surface of each of the primary rollers.

10. A method for separating a stream of masa utilizing a pair of aligned, opposed separator conveyors having facing surfaces, the longitudinal ends of the separator conveyors positioned adjacent to a nozzle connected to a masa producing device, the method of separating the masa stream comprising the steps of:

moving the facing surfaces of the separator conveyors at equal speed away from the nozzle;

feeding a generally continuous masa stream through the nozzle such that the masa contacts at least one of the facing surfaces of the separator conveyors and is guided between the facing surfaces of the separator conveyors; and

gripping the masa stream between both facing surfaces of the separator conveyors, pulling the masa stream such that the masa stream is separated into masa logs.

11. The method as defined by claim 10, wherein the method further comprises the step of:

arranging the facing surfaces of the separator conveyors to curve toward each other such that a cradle is formed to securely grip the masa.

12. The method as defined by claim 11, wherein the method further comprises the step of:

adjusting the speed of the facing surfaces of the separator conveyors to change the length of the masa logs.

13. A method of feeding masa to masa hopper within a food processing system, the food processing system further having a masa producing device and at least two masa hoppers, the masa hoppers and the masa producing device connected by at least two endless belt feed conveyors having upper surfaces moving in the same direction, the feed conveyors positioned in an upstream and downstream relationship relative to each other, each masa hopper having an associated sensor for sensing the level of mass and an opening positioned below a diverter gate positioned between the feed conveyors, each diverter gate connected to an associated mechanism and pivotable between an open position, where the masa is guided from the upstream feed conveyor to the downstream conveyor, and a closed position, where the masa is guided into the masa hopper, the method comprising the steps of:

moving masa logs, previously separated from a stream of masa produced from the masa producing device, along the upper surfaces of the feed conveyors;

sensing the level of masa within an associated masa hopper;

causing a signal to change its state when the level of masa within the masa hopper is below a predetermined level; and

selectively opening and closing the diverter gate to control the flow of masa logs to the masa hopper in response to said change in signal.

14. The method of feeding masa as defined in claim 13, wherein the mechanism is a pneumatic cylinder connected to a controller, the method further comprising the steps of:

programming the controller to compare said signal to a predetermined value; and

selectively commanding the operation of the pneumatic cylinder to control said selective opening and closing of the diverter gate.

15. A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa and side walls and a bottom wall defining a slot, the masa hopper also having at least one shaft above the bottom wall, each shaft having projections, the method comprising the steps of:

placing the masa through the opening in the masa hopper;

feeding the masa to at least one shaft;

rotating the shaft;

removing gas bubbles from the masa with the projections on at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projections on at least one shaft.

16. The method for feeding masa as defined in claim 15, wherein said feeding is accomplished by gravity.

17. The method for feeding masa as defined in claim 15, wherein said rotating is accomplished by a motor.

18. The method for feeding masa as defined in claim 17, wherein there is a scrapper for each primary roller, each scrapper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the steps of:

separating masa from the lower surface of each of the primary rollers.

19. The method for feeding masa as defined in claim 15, wherein the masa hopper also has a pair of opposed, horizontally, aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

20. The method for feeding masa as defined in claim 19, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing the movement of the masa past the ends of the primary rollers.

* * * * *

Docket No. CAS1PAU24R2 **Reissue Application**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue of:	Examiner: A. Corbin
Sanchez et al.	Group Art Unit: 1761
Patent No.: 5,635,235	
Date of Patent: June 3, 1997	
Serial No.: 09/753,171	Irvine, California
Filed: December 29, 2000	April 1, ~~2001~~ 2002
For: METHODS FOR HANDLING MASA	

1st AMENDMENT

BOX REISSUE
Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

This Amendment is responsive to the Office Action dated October 3, 2001.

In the Specification

Please disregard the patentee's prior instructions in its Substitute Preliminary Amendment mailed on May 4, 2001, entered on May 7, 2001, and instead replace the paragraph beginning at column 5, line 49 with the following:

The preferred masa handling system 10 (FIG.1) is a part of a larger arrangement of apparatus intended for the commercial production of tortillas or

other food having a masa dough as an ingredient. The general arrangement of the preferred masa handling system 10 will now be described. A commonly available commercial mixer 12 is located at the beginning of the production line. The mixer 12 has a pivoting door 14 which can rotate downward towards a masa 18 and feeds a generally continuous masa stream 20 through a nozzle 22. Two vertically opposed and aligned endless belt separator conveyors 24 and 26 have moving surfaces 28 and 30 which face each other. The longitudinal ends 32 and 34 of separator conveyors 24 and 26 are mounted adjacent to the nozzle 22. One of the two separator conveyors 24 is "L" shaded and has vertical section, or vertical portion, 36 and a horizontal section, or horizontal portion, 38 which terminates above [a] **an intermediate** masa hopper 40 **that is in between two feed conveyors as shown in Fig. 1**. The vertical section 34 of the "L" shaped separator conveyor 24 extends longitudinally below the longitudinal end of the other separator conveyor, thereby providing a moving surface opposite from the nozzle 22. A deflector plate 41 is mounted on the end of the other separator conveyor 26. The previously discussed separator conveyors 24 and 26 move the masa 18 to the **[first]** **intermediate** masa hopper 40. **The** **[That]** masa **[18]** hopper 40 must be supplied with masa 18 periodically.

Replace disregard the patentee's prior instructions in its Substitute Preliminary Amendment mailed on May 4, 2001, entered on May 7, 2001, and instead replace the paragraph beginning at column 6, line 9 with the following:

A selectively operable diverter gate, for periodically allowing resupply of the masa hopper 40, is located **[adjacent to the end 44 of]** **in a gap between an upstream feed conveyor (**the horizontal section 38 of the "L" shaped separator conveyor 24 **as shown in Fig. 1) and a downstream feed conveyor 46**. The diverter gate 42 is shown in its open **gap** position. However, when the diverter gate 42 is **[closed]** **in a closed gap position**, its top surface 45 forms a gravity slide that feeds to a horizontal **downstream** feed conveyor 46, which, in turn, feeds another masa hopper **which, as shown Fig. 1, may be an end masa hopper** 48. It will be understood that while two masa hoppers 40 and 48 are shown the masa handling system 10 can be adapted for use with any number of masa hoppers. Therefore, the invention is not limited by the number of masa hoppers.

In the Claims:

Please amend the following claims as shown in the appendix attached hereto in order to read as follows relative to the original patent specification:

38. (Amended) A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa and a slot for dispending masa, the masa hopper also having at least one shaft above the slot, each shaft having a projection, the method comprising the steps of:

placing the masa through the opening in the masa hopper;

feeding the masa to at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projection on at least one shaft.

41. (Amended) The method for feeding masa as defined in Claim 38, wherein said forcing is accomplished by rotating the shaft with a motor.

42. (Amended) The method for feeding masa as defined in claim 38, wherein the masa hopper also has a pair of opposed, horizontally aligned, primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

44. (Amended) The method for feeding masa as defined in claim 42, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing movement of the masa past the ends of the primary rollers.

45. (Amended) A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa and a slot for dispensing masa, the masa hopper also having at least

one shaft above the slot, each shaft having a projection, the method comprising the steps of:

placing the masa through the opening in the masa hopper;

feeding the masa to at least one shaft; and

removing gas bubbles from the masa with the projection on at least one shaft.

48. (Amended) The method for feeding masa as defined in Claim 45, wherein said forcing is accomplished by rotating the shaft with a motor.

49. (Amended) The method for feeding masa as defined in claim 45, wherein the masa hopper also has a pair of opposed, horizontally aligned, primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

51. (Amended) The method for feeding masa as defined in claim 49, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing movement of the masa past the ends of the primary rollers.

52. (Amended) A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa and a slot for dispensing masa, the masa hopper also having at least one shaft above the slot, each shaft having a projection, the method comprising the steps of:

placing the masa through the opening in the masa hopper;

feeding the masa to at least one shaft;

removing gas bubbles from the masa with the projection on at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projection on at least one shaft.

54. (Amended) The method for feeding masa as defined in Claim 52, wherein said forcing is accomplished by rotating the shaft with a motor.

55. (Amended) The method for feeding masa as defined in claim 52, wherein the masa hopper also has a pair of opposed, horizontally aligned, primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.


57. (Amended) The method for feeding masa as defined in claim 55, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing movement of the masa past the ends of the primary rollers.

REMARKS

This amendment is responsive to the Office Action mailed on October 3, 2001. Attached hereto, therefore, are a request for a three-month extension of time and the appropriate fee.

Paragraphs 1 to 4 - Informalities

The patentee gratefully acknowledges the Examiner's identification of certain minor informalities in the specification and claims.

As to the specification, the patentee has endeavored to address each of the Examiner's concerns in the above-noted amendments to the specification that have been provided in accordance with 37 C.F.R. 1.173 (b)(1) and 1.173(d). The only amendment differing slightly from the Examiner's suggestion is the replacement paragraph beginning at column 6, line 9. It was not the patentee's intent to cancel "the horizontal ... Conveyor 24" altogether, but rather to include such language in a parenthetical.

As to the claims, the patentee has amended Claims 38, 42, 45, 49, 52 and 55 as noted above by including the entire text of each claim being changed in accordance with 37 C.F.R. 1.173(b)(2) and by including the marking required by 37 C.F.R. 1.173(d). Claims 38, 45 and 52 have been amended to remove any reference to a "wall" since it is sufficient, the patentee respectfully submits, to refer to a hopper without unduly limiting the claim to the geometric details associated with the walls of any particular hopper configuration. Claims 42, 49 and 55 have been amended as suggested by the Examiner.

The patentee invites the Examiner to contact the undersigned attorney if any further issues of this nature become apparent.

Status of Claims and Support for Claim Changes

In accordance with 37 C.F.R. 1.173(c), the patentee has attached an appendix hereto containing the above-noted changes to the claims, an indication of the status (i.e., pending or canceled) of all patent claims as of the date of this amendment, and an explanation of the support in the disclosure of the patent for the changes made.

Paragraphs 5 to 6 – Rejection of Claims 38-57 Under Section 112

The patentee has carefully amended the claims in view of the Office Action's Section 112 concerns, without adding new matter. The reference to a "wall" has been removed altogether so that there is no need to describe such walls. The antecedent issue relating to "said rotating" in Claims 41, 48 and 54 has been resolved amending the claims to specify that "said [rotating] forcing is accomplished by rotating the shaft with a motor." The antecedent issue relating to "the movement" in claims 44, 51 and 57 has been resolved by deleting "the" as suggested by the Examiner.

Paragraphs 7 to 8 – Reissue Declaration

The Office Action objects to the reissue declaration in this application on the basis that the subject declaration applies only to the parent. The patentee respectfully traverses.

There were three reissue declarations filed in the parent application[1]. In each declaration, the inventor states that he believes the patent to be "wholly or partly inoperative" "by reason of the patentee claiming more or less than he had the right to claim in the patent." Applicant respectfully submits that this generic language clearly covers the present continuation reissue application.

The patentee presumes that the Examiner may be focusing on the prior declarations' exemplary indication that "The claims directed to a 'Diverter Gate' are too narrow." However, that statement was only inserted in compliance with 37 C.F.R. 1.175(a)(1) which simply requires that the reissue declaration state "at least one error being relied upon as the basis for reissue." Obviously, therefore, there can be other errors than the "at least one" that is specifically listed, such as those at issue in this application.

Based on the foregoing, Applicant respectfully submits that the reissue declarations already of record are effective.

Paragraph 10 – Rejection of Claims 38-57 Under 35 U.S.C. 251

The Office Action rejects Claims 38-57 under 35 U.S.C. 251 as being impermissible broadened in a reissue application filed outside the two year statutory period. Applicant respectfully requests reconsideration of this rejection as it either ignores applicant's priority claim or is based on a misinterpretation of the law.

The statutory patent law relating to reissue applications is set forth in 35 U.S.C. 251 which reads as follows (emphasis added):

[1] The patentee was forced to submit a Rule 1.47(a) Petition because one of the inventors refused to sign.

Whenever any patent is, through error without any deceptive intention, deemed wholly or partly inoperative or invalid, by reason of a defective specification or drawing, or by reason of the patentee claiming more or less then he had a right to claim in the patent, the Director shall, on the surrender of such patent and the payment of the fee required by law, reissue the patent for the invention disclosed in the original patent, and in accordance with a new and amended application, for the unexpired part of the term of the original patent. No new matter shall be introduced into the application for reissue.

The Director may issue several reissued patents for distinct and separate parts of the thing patented, upon demand of the applicant, and upon payment of the required fee for a reissue for each of such reissued patents.

The provisions of this title relating to applications for patent shall be applicable to applications for reissue of a patent, except that application for reissue may be made and sworn to by the assignee of the entire interest if the application does not seek to enlarge the scope of the claims of the original patent.

No reissued patent shall be granted enlarging the scope of the claims of the original patent unless applied for within two years from the grant of the original patent.

In regard to this particular reissue application, patent no. 5,635,235 issued on June 3, 1997. A parent reissue application was filed on June 3, 1999, i.e. before the expiration of the two years broadening period defined by the fourth paragraph of 35 U.S.C. 251 (underlined above)[2].

This continuation reissue application seeks to broaden the claims of the surrendered patent based on its priority rights to the filing date of the parent reissue application that qualifies for broadening.

---

[2] On January 2, 2001, the parent reissue application no. 487,040 matured into reissued patent no. RE37008.

Under the Court's interpretation of 35 U.S.C. 251, the submission of broadening claims after the two year period is permissible so long as the public was placed on notice of the patentee's intention to enlarge the claims through the prior submission of broadening reissue within the two year broadening period. See, e.g. In re Doll, 164 U.S.P.Q. 218 (CCPA 1970), but c.f. In re Graff, 111 F.3d 874, 42 U.S.P.Q.2d 1741 (Fed. Cir. 1997).

The facts of In re Doll are similar to ours. In the 1970 In re Doll decision, the CCPA held that an applicant may submit broadening claims within a reissue application after the two year broadening period so long as the applicant had already submitted broadening claims, even different claims, before the expiration of the two year broadening period[3].

The Board refused to grant Doll's claims based on 35 U.S.C. 251. According to the CCPA, 164 USPQ at 219, the issues presented by In re Doll were:

> (1) Whether claims presented in a reissue application filed within two years of the original patent grant are barred by 35 U.S.C. 251 when such claims are not submitted until more than two years after the grant and are broader in scope then both the original patent claims and the broadening reissue claims originally submitted, and
>
> (2) Whether the reissue oath originally filed with the reissue application is adequate to support the newly submitted claims.

[3] On 10/31/57, before the expiration of the two year broadening period, the In re Doll applicant filed a reissue application with some additional claims that that were broader than the original claims. The new claims were copied from another patent in order to invoke an interference. The interference was subsequently terminated. On 7/28/60, after the expiration of the two year broadening period, the applicant copied some other claims from a second patent. During the second interference, also after the expiration of the two year broadening period, the applicant copied even more claims from a third patent.

The CCPA reversed the Board and held that the later filed claims are not barred by 35 U.S.C. 251 because the statute's "applied for" language simply refers to the filing of an application, not when the broadening claims are presented in such application. Id. At 220. The CCPA further held that the applicant's reissue oath was adequate.

In the 1997 In re Graff decision, the issue of later submitted claims was addressed within the context of a several continuation reissue applications. In re Graff distinguished In re Doll by holding that broadened claims may not be submitted in a continuation reissue application filed after the two year period when the patentee had not sought to enlarge the scope of the claims before the expiration of the two year period.

The pertinent facts of In re Graff are as follows. On 10/23/84, the PTO issued the Graff Patent. On 7/29/96, before the expiration of the two year broadening period, Mr. Graf filed a non-broadening[4] (!!!) reissue application to correct an error in Figure 5. In the first Office Action, the Examiner rejected Graff's claims as obvious over a newly cited reference. On 2/2/98, now several years after the two year broadening period of 35 U.S.C. 251, Graf filed an amendment that changed some claims without affecting their scope and broadened others. Graf included a new declaration "in a form appropriate to broadening reissue applications" and argued for patentability over the cited reference. On 6/27/90, notwithstanding the CCPA's In re Doll decision, the PTO rejected all of the broadened claims on the ground that Mr. Graff had not applied for a reissue patent enlarging the scope of the claims within the two year statutory period for

[4] The present application's parent applications was, by contrast, a broadening application.

filing broadening reissue applications. The PTO did, however, allow the claims of unchanged scope.

In response, Graff elected to secure a reissue patent with the corrected drawings and allowed claims, while prosecuting the broadened claims in a continuation application. On 3/8/91, therefore, Graf filed a continuation of his reissue application containing only the broadened claims. After the broadened claims were again rejected for being filed after the two year period, Graf appealed to the Board in reliance on In re Doll, arguing that "it was sufficient that he had filed a non-broadening reissue application within the two year period". In re Graff, 42 U.S.P.Q.2d at 1472. The Board, however, distinguished In re Doll on its facts and affirmed that the continuation reissue application could not be granted. Graff then appealed the Board's decision to the U.S. Court of Appeals for the Federal Circuit.

The Federal Circuit noted that the situation then before them in In Re Graff was unlike In re Doll which (like this case!) involved a broadening application that was filed before the expiration of the two year period. In re Graff, 42 U.S.P.Q.2d at 1472. The Federal Circuit, at 1741, affirmed the Board as follows:

> We conclude that the reissue statute requires that proposals to broaden a patented invention must be brought to public notice within two years of patent issuance. The interested public is entitled to rely on the absence of a broadening reissue application within two years of grant of the original patent.

This case, however, is not at all like In re Graff because Graff first submitted broadening claims more than two years after grant. This case, rather, is like In re Doll in that the patentee here filed a broadening reissue application before the expiration of the two year period. It makes no difference that the claims of this

continuation reissue application are different than the claims in the parent reissue application since In re Doll presented that same fact situation (claims added after two year period different than those presented before end of two year period).

The purpose of the statute, as noted by the Federal Circuit in In re Graff, is simply to put the public on notice that the patentee proposes to broaden the patent claims. That has been done here since the patentee here, like the patentee of In re Doll, sought to broaden the claims before the expiration of the two year period.

Based on the foregoing analysis of 35 U.S.C. 251 as interpreted by In re Doll and In re Graff, the patentee respectfully requests that the Examiner withdraw the rejection under 35 U.S.C. 251, fourth paragraph.

Summary

Applicant respectfully submits that this reissue application is ready for allowance and invites the Examiner to telephone the undersigned attorney if it appears that a telephone conference would further this case in any way.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: **Box Reissue, Assistant Commissioner for Patents, Washington, DC 20231** on

April 2, 2002

By Angela Williams

Signature
April 2, 2002

Respectfully submitted,

Joseph C. Andras
Registration No. 33,469
MYERS, DAWES & ANDRAS LLP
19900 MacArthur Blvd., Suite 1150
Irvine, CA 92612
(949) 223-9600